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REPORT

— OF —

JOHN S. SUDLER, of Somerset County,

— AND —

RICHARD T. BROWNING, of Garrett County,

— THE —

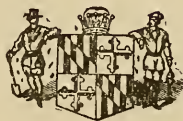
COMMISSIONERS OF FISHERIES

— OF —

MARYLAND

— FOR —

1894 AND 1895.



ANNAPOLIS:
KING BROS., STATE PRINTERS,
1896.

LIST OF FISH COMMISSIONERS OF MARYLAND.

Western Shore—

1874-1875 T. B. FERGUSON.
 1876-1877 “
 1878-1879 “
 1880-1881 “
 1882-1893 “
 1884-1885 G. W. DELAWDER.
 1886-1887 “
 1888-1889 “
 1890-1891 “
 1892-1893 RICHARD T. BROWNING.
 1894-1895 “

Eastern Shore—

PHILIP W. DOWNES.
 “
 THOMAS HUGHLETT, SR.
 “
 “
 DR. E. W. HUMPHREYS.
 “
 STEPHEN P. TOADVIN.
 GRANVILLE R. RIDER.
 JOHN S. SUDLER.
 “

REPORT.

To his Excellency, FRANK BROWN,
Governor of Maryland.

SIR :

We have the honor to submit, herewith, our second biennial report of the transactions of the State Fish Commission for the years 1894 and 1895, it being the twentieth and twenty-first annual reports of the doings of the State Commissioners of Fisheries of Maryland, and of the work accomplished by us and under our jurisdiction, for the past two years of our administration, ending December 31, 1895, as required by Section 87, Article XXXIX, of the Code of Public Laws of the State of Maryland, with such suggestions as have presented themselves to us, in the performance of the duties prescribed by the Act of 1876, chapter 47, as amended by chapter 189, of the session of 1890, for the protection and propagation of food-fishes in the waters of this State, as the result of that observation and experience.

The Commissioners of Fisheries in the State of Maryland desire to acknowledge the generosity and earnest support vouchsafed to them in their work by that portion of the people of the State who are most closely identified therewith, and especially the fishermen and those engaged in this extensive and growing industry; as evidenced by their almost universal approbation and commendation of the great advantage, benefit and aid to them arising from the fish-cultural operations of the commission.

Commissioners Ferguson and Downes, in the first report of the Commissioners of Fisheries of Maryland, very forcibly set forth the unsatisfactory condition, at that time, of the fisheries of the State, the most valuable of which were then rapidly becoming less and less productive, while the waters of the State were being depleted of their yield of such food-fishes to an alarming extent; they inviting attention to the great necessity placed upon the State for ample protection of such food-fishes, and for a speedy resort to artificial means of fish-culture to restore the supply before the exhaustion was complete and irreparable.

Their prediction that our rivers, bays and streams could be made, at no very great expense, more productive than they had ever been, and that the best food-fishes would become more abundant than when the earliest settlers of the State commenced their destruction, has proven a verity in less than twenty years of moderate and inexpensive effort.

The beneficial results accruing to the State, through the workings of this wise provision of the Legislature of 1874, have been so great and varied, that these twenty years of fish-hatching operations and fish distribution, show conclusively that, if the manner of handling fish is continued or improved upon, and the suggestions made from time to time, relative thereto, should be promptly and efficiently carried out, a bountiful and permanent supply of our favorite food-fishes may be depended upon for all future time, and every man, at little expense or inconvenience may be able to supply his table therewith on shortest notice.

In the Bulletin of the United States Fish Commission, Vol. XIV for 1894, by the late Marshall McDonald, Fish Commissioner, just published, is given a statistical report of the fisheries of the Middle Atlantic States, prepared by Hugh M. Smith, M. D., assistant in charge of the "Division of Statistics and Methods of the Fisheries," United States Fish Commission, viz: New York, New Jersey, Pennsylvania, Delaware, Maryland and Virginia.

From these reports we learn that these States have an area of 159,700 square miles, the land area being 152,065, and the water area 7,635 square miles, subject to the jurisdiction of the several States, and distributed as follows:

States.	Square Miles.
New York.....	1,550
New Jersey.....	360
Pennsylvania.....	230
Delaware.....	90
Maryland, including District of Columbia.....	2,360
Virginia.....	2,325
Miscellaneous (unassigned waters in Delaware, Lower New York and Raritan bays).....	720
Total... ..	<hr/> 7,635

New York has the greatest *land* area, but Maryland, next to the smallest of these States, has relatively and actually, the

largest *water* area; about twenty per cent. of the total surface of the State, 11,124 square miles.

The Middle Atlantic States have the distinction of maintaining more valuable fisheries than are carried on in any other section of the United States. The fishing population is about as numerous as that in all the other Coast and Lake States combined.

The value of the fisheries, which afford the best basis for determining the importance of the industry, is much greater in this region than in any other, being one and a half times that of New England, the next most prominent section. It is estimated that fully ninety per cent. of the value of the fishery products of this section is from waters within the control of these States.

The following schedule shows the number of persons engaged in the fisheries of the Middle Atlantic States in 1891:

STATE.	Fishermen in vessels.	Shore Fishermen.	Transpor- tation.	Miscellan- eous.	Total.
New York.....	2,250	7,858	96	2,042	12,246
New Jersey....	2,017	7,889	201	532	10,639
Pennsylvania.....	348	1,631	5	289	2,273
Delaware.....	103	1,653	43	431	2,230
Maryland (inc. D. C.).....	6,892	19,867	1,450	11,735	39,944
Virginia.....	3,603	16,008	705	3,275	23,591
TOTAL.....	15,213	54,906	2,500	18,304	90,923

Schedule showing the food-fishes of these States in pounds, and their market value:

	Pounds.	Value.
New York.....	23,882,317	\$ 923,226
New Jersey.....	34,555,512	1,337,052
Pennsylvania.....	6,399,957	197,601
Delaware.....	5,647,251	173,555
Maryland.....	32,747,537	760,425
Virginia.....	31,162,424	802,625
Total.....	134,394,998	\$4,194,484

The following are the names of the more valuable fishes caught in Maryland waters, with their local names:

Alewives	Summer herring.
Blue fish	Salt-water tailor.
Butter fish	Harvest fish.
Croaker	Crocus.
Menhaden	Alewife, or old wife.
Sea bass	Black perch.
Spanish Mackerel	Ray Mackerel.
Spot	Crocus
Squeteague	Trout.
Striped bass	Rock.
Tautog	Salt-water chub.
Weak fish	Salt-water trout.
Yellow perch	Yellow ned.

In the item of persons employed, capital invested, and quantity and value of products, Maryland, it will be seen, surpasses all the other States of this region. The fishing population also excels that of any other State, although the value of the catch and the investment are less than in some others. The great variety of fish and the excellence of the quality of the food-fishes of Maryland will compare favorably with that of any State.

It is noteworthy as having the largest fleet of vessels engaged in the fisheries and the most extensive packing and canning houses. In 1890 Maryland had a fishing population of 40,452; an invested capital of \$7,649,904, and its fishing products, including shell fish, were valued at \$6,019,165.

The apparatus for catching fish comprise 536 seines, with a value of \$76,780; 733 pound-nets, worth \$68,655; 11,976 gill-nets, valued at \$97,289. The shad catch alone of 1891 was worth \$211,579.

There are sixteen counties in the State bordering on important bodies of water, only one of which, Worcester, abuts on the ocean; the others are on the Chesapeake Bay and the rivers tributary thereto.

Each of eleven counties has over 1,000 persons engaged in the fishing industry. Somerset County, by reason of its extensive natural oyster beds, has the largest number of persons engaged in actual fishing, larger in fact than any other single county in the United States, with the probable exception of Essex County, Massachusetts. Dorchester, Talbot, Anne

Arundel, St. Mary's and Wicomico counties follow Somerset closely with the number of fishing population.

The aggregate investment, vessel property, nets, etc., of Somerset County, in 1891, was \$1,221,669, of which \$678,639 was directly devoted to fishing property. After Somerset comes Dorchester, with \$596,546; Anne Arundel, with \$323,218; Talbot, with \$271,899; Wicomico, with \$141,126, and St. Mary's, with \$121,060.

More than one-third the value of the products of the fisheries of Maryland in 1891, represented the operations of the fishermen of Somerset County, whose receipts for that year were \$2,342,419. Of this sum, however, \$2,099,352 should be credited to oysters, and more than half the remainder, or \$177,269 to crabs, in both of which products Somerset excels all others.

The counties ranking first in the value of other important fish products are: Harford, in alewives and shad; Somerset, in menhaden; Baltimore, in striped bass; Worcester, in trout, and Kent, in white and yellow perch.

Statement by counties of number of persons employed in the fisheries of Maryland in 1891:

Allegany.....	.....
Anne Arundel....	\$ 2,624
Baltimore (including city).....	11,052
Calvert.....	1,383
Caroline.....	341
Cecil.....	868
Charles.....	488
Dorchester.....	4,434
Frederick.....	.....
Garrett.....	.....
Harford.....	1,121
Howard.....	.....
Kent.....	1,024
Montgomery.....	.....
Prince George.....	143
Queen Anne.....	1,082
St. Mary's.....	2,166
Somerset.....	7,756
Talbot.....	3,136
Washington.....	.....
Wicomico.....	1,554
Worcester.....	593
District of Columbia.....	179
Total.....	39,944

STATEMENT BY COUNTIES AND SPECIES OF THE YIELD OF THE FISHERIES OF MARYLAND,
IN POUNDS, IN 1891.

COUNTY.	Alewives.	Bluefish.	Eels.	Menhaden.	White Perch.	Yellow Perch.	Shad.	Squeteague or Trout.
Anne Arundel.....	545 900	72,500	33,840	23,600	26,990	37,160	122,500	1,600
Baltimore.....	392,400	10,100	59,945	7,576,000	151,253	244,400	80,164	5,650
Calvert.....	322,800	64,200	.....	727,500	35,780	31,170	57,463	10,700
Caroline.....	384,000	.....	19,835	.....	25,520	50,295	419,302	.....
Cecil ..	4,021,870	.....	100,561	.....	110,320	283,890	1,042,209	.....
Charles.....	993,645	1,280	6,790	.....	25,093	16,750	625,440	2,360
Dorchester.....	712,230	20,760	62,740	4,898,320	52,150	76,125	445,865	18,335
Harford.....	4,039,500	.....	99,270	.....	82,204	102,733	956,431	.....
Kent.....	675,525	42,987	39,350	.....	173,444	181,664	320,873	3,110
Prince George's.....	265,581	.....	.....	.....	11,610	5,200	54,391	.....
Queen Anne's.....	208,200	25,445	34,230	1,200,000	88,061	123,244	61,429	3,700
St. Mary's.....	1,306,300	136,542	8,520	749,500	43,883	19,372	230,200	240,416
Worcester.....	441,900	20,000	72,808	205,000	109,595	7,680	49,521	308,750

NOTE.—Allegany, Calvert, Frederick, Garrett, Howard, Montgomery, Somerset, Talbot, Washington and Wicomico counties not reported.

Attention was invited in our first biennial report to the lack of interest and to the indifference manifested by our fishermen in the tentative efforts made by the first commissioners, Messrs. Ferguson and Downes, to check this then marked diminution of the supply of shad and herring, and other food fishes, in the waters of the State, by means of the hatching of eggs and rearing of young fish ; but that indifference has perceptibly changed from year to year, and your present commissioners have had no such opposing influence to contend with. The fishermen, as a class, have shown a practical interest in all our movements, and that interest is constantly increasing.

Within the four years of our administration we have met persons heretofore indifferent and paying little or no regard to this means of increasing this source of food supply, and otherwise careless as to the waste and destruction of immature fish, who now fully realize the value and importance of our methods of increasing and improving, by artificial propagation, the supply of the best food fishes in our midst ; who give practical demonstration of a change of views, by their zeal and ready proffer of assistance in every reasonable way to increase and enlarge our resources, and in the stocking of every river and stream of Maryland, wherever such food-fishes are known to grow and thrive.

We have succeeded in our work the past two years (which have not been model years for fish propagation, because of the backward season each year), beyond our most sanguine expectations, by reason of the valuable services of our faithful and competent superintendents, who are thoroughly conversant with the peculiar necessities and requirements of the several fishing interests of the State, besides being trained in the methods of propagating and rearing and caring for such young fish as are universally held to be varieties best adapted to the waters of Maryland.

The State of Maryland, if we consider the Chesapeake bay and its larger tributaries, has an enormous coast line of salt water.

While its ocean shore is limited to about twenty-five miles, its bay and river line has been computed to be over 2,170 miles.

The Chesapeake is a great highway for the commerce of the world. In contemplating its possibilities in this direction we are apt to lose sight of the fact that it is itself an area of vast and profitable production.

Many salt-water varieties of fish appear in the bay and its tributaries in countless numbers at their particular seasons, and furnish profitable and extensive fisheries, and few settlements in any of the tide-water counties are distant therefrom, more than five or six miles.

The Potomac river has always been celebrated for the excellence and value of its shad and herring fisheries. Reports of their magnitude have been handed down to us from early days, and from them we gather that the production then must have been simply fabulous, as compared with that of our own day.

The Susquehanna has also been celebrated for its shad. In the early settlement of the country the abundant run of shad in the Susquehanna and its many large tributaries was a matter of prime importance to the people. The accounts that come down to us in regard to this abundance, given by the early settlers on these rivers, and in fact, all rivers on the Atlantic slope, seem almost fabulous to us in these days, but if tradition has invented exaggerated stories concerning all other rivers, those accounts concerning the Susquehanna, at least, are undoubtedly established by authoritative data.

Maryland also partakes of an equal advantage of proximity to excellent markets, which is enjoyed by other sections. The accessibility to these and the readiness with which the products may be sent there direct from the fishing-grounds are important factors in the development of this great industry. The principal shipping points on the Eastern Shore, having railroad facilities, are Cambridge, Chestertown, Crisfield, Easton and Salisbury, where the bulk of fish is forwarded to Baltimore, New York and Philadelphia.

The town of Crisfield is located on a splendid harbor that is seldom frozen over; the business portion of the town was originally built on piling in water from three to seven feet deep, and gradually filled in with the oyster shells from the large packing houses, until the whole section has become a solid mass of shells, upon which a soil has been deposited, and many of the yards of private residences make a beautiful display of flowers in season and a compact sward of velvety grass. Many homes have extensive vegetable gardens, which are the pride of their sea-faring owners.

The inhabitants are largely dependent upon the waters for a livelihood and many are directly or indirectly engaged in the oyster industry in the winter, and in the fish and crab industry in the summer. The latter having originated here, has been

carried on more extensively at this point than all other places in the United States.

Maryland, as is well known, leads all others in the extent of its oyster trade, which represents over eighty per cent of the value of the fishing products, yet this is not the only branch of this industry in which the State is pre-eminent.

The crab fishery which, as has been stated, has sprung up in the past few years; the terrapin fishery, which has been celebrated for years; the alewife fishery, with evidences of its vastness shown by the factories, dotted along its river line; the white perch, the striped bass or rock and the yellow perch fisheries—all and each are more valuable and productive than in any other State.

The shad fishery ranks next to New Jersey in importance, and the yield of blue fish, menhaden and trout (squteague) is very large.

The natural geographical advantages of the State of Maryland are truly so great that but little effort has been necessary, economically applied, to make the waters of the State (one-fifth of its whole area) yield the utmost abundance of food products. But this, however, must be carefully watched and protected, and whenever and wherever possible, improved in kind and quality as well as quantity.

The best means to re-stock our rivers with shad, the finest and most important of all the fine food-fishes of our Maryland waters; and with herrings, the next most important food-fish that frequent our streams; and with perch, rock and trout, which we have with us the year round, are, and have been, the establishment of hatching stations on as many of its streams as practicable. With the appropriation at our command we have not found it to be either successful or practicable to establish or continue more than four hatching stations; one for trout and shad at Druid Hill Park, in Baltimore, and three upon the Eastern Shore, for shad, herring, perch and rock, although little has yet been done or undertaken in propagating the latter fish.

There could be profitably established, in our opinion, if the fund were sufficient to justify and to meet the current expenses of a superintendent to overlook, and men to assist in the spawning season, two more stations for the propagation and distribution of fish; one on the Patuxent, to supply the waters of southern Maryland; the other at the "Head of the Bay," where fish-culture by the State was first inaugurated, to supply

the rivers and streams of Baltimore, Harford and Cecil counties. All of these waters we have not been able to supply with fish fry as liberally as we have desired for want of proper and direct transportation from the hatcheries now established. The Potomac river, however, has been for years, and still is, supplied from the great storehouse of the United States Fish Commission.

We find that the greatest success attends those efforts which have been made to place the young fry in the streams as near their source as practicable, where they will be beyond the depredations of other fish or of fishermen while in their helpless stage; also, that the greater the quantity of ova collected each year, and the more speedy the young fish are turned into their native element, the larger and more satisfactory will be the results.

An industry of so much magnitude, in which so many men are employed and so much capital is invested, is well worthy of the fostering care of the State, for it brings many thousands of dollars annually for distribution among the laboring classes, who are the bone and sinew of the State, while placing cheap food upon the tables of the masses and putting substantial revenue into the pockets of the fishermen, whose exposure and suffering in their daily toil demand most liberal compensation.

In addition to re-stocking our rivers and streams with these food-fishes, and thereby increasing the supply, by means of these hatcheries, there are still other, and possibly as important, methods adopted by the Commission and by the Legislature for the *protection* of these fish when hatched and distributed in their native waters, and when they return thereto for purposes of reproduction.

The fishermen generally recognize the fact that the catching of fish of immature size and at improper and at all seasons has been greatly against their own interests, more directly perhaps than against those of any other class of persons; and that if persisted in, must nullify, in a great measure, the advantages sought to be gained by fish propagation and distribution, if not utterly destroy them. Some hesitate to co-operate with the Commissioners, because they see others, engaged in the same industry, who care only for their individual interests or pressing needs, catching and taking any and everything in the shape of food-fish, that commands a price or that can find a market. These honest and more law-abiding fishermen, however, are taking courage as they see this class of their fellow laborers

diminishing, and are thereby becoming more confident that the early future will witness the entire abandonment of these pernicious practices.

It is probable that but few persons in the State—only those indeed directly interested in the industry, either theoretically or practically—have paused to think of the magnitude of this food-fishing industry in this State, and yet, we believe that, by a reference to the figures in the several schedules that accompany this report and that of our last report, giving the actual operations of the Fish Commissioners, the subject will be found worthy of a careful consideration of the Legislature, and that the necessity will be seen for additional legislation to more effectually protect this industry and preserve its usefulness for the present and future advancement of the State. Fish need legislative protection at a particular period of the year, and it is absolutely necessary to protect them as fully as possible during such time and when they are spawning. It is when these fish are aggregated in large bodies and moving from place to place, either under the stimulus of reproduction, or the search for food, or other causes, that they furnish the best opportunity to man for their capture and utilization.

Little is known of the shad or herring during a large portion of the year; but at certain periods these fish collect in large bodies, and by a change of place come within the reach of man's relentless grasp.

The movements and migrations of fish are of two classes, the one irregular and occasional, the other regular. The causes of these variations are entirely unknown. The regular migrations of fishes are for the most part dependent on the instinct of reproduction, which causes them to seek grounds and regions most suitable to the purpose, especially, so far as it relates to a safe abode for the young during the earlier months of their life; the search for food; the influence of temperature, a most important factor; and the pursuit of predaceous fishes, although this latter cause is generally much more restricted in its operations than the others.

The appliances for catching fish have doubtless had some effect, but this is shown more in a reduction of numbers by the actual destruction of the parent fish and eggs, than by causing a definite change of place.

Anadromous fish are those species that pass most of their time in the ocean and, when mature, enter and ascend fresh water rivers for the purpose of depositing their eggs. It was formerly supposed, by the early writers, that these anadromous

fish moved in great bodies along our coast, sending off detachments into the mouths of rivers as they went by. The more rational hypothesis, and the one that now is most generally held by those who have studied their habits, is that they live in the deeper waters of the sea in nearly the same latitude as the mouths of rivers in which they were hatched, possibly extending their movements outward from five to fifty or even one hundred miles, where they attain their full growth, but still maintaining a certain relation to their native river, to which they return at the proper season. An experimental test of this fact was given on page 10 of our last report; but by what prescience they are enabled to understand that their progeny require a change of abode and especially from salt water to fresh water, it is, of course as yet, impossible to explain. The young remain in the fresh waters where hatched or placed from the hatchery, for a time, the period varying with the species, after which they follow their parents in their return to the sea.

Next to reproduction comes the search for food, as influencing the migration and movement of fishes. Certain species of fishes follow up particular varieties of other fishes, notably the pursuit of the blue fish after menhaden or alewives.

Whenever an impassable obstruction is laid across a river heretofore ascended by anadromous fish for the purpose of reproduction, which excludes them from reaching their former breeding grounds, a marked effect upon their subsequent movements is very soon noted. Usually for the first two or three years not much difference is appreciable, as these fish require from three to four years to mature after passing down the river before they return to their starting point for reproduction. There will, therefore, necessarily be three years of successive return of schools of these fish, but after that period there will be no young fish from that river to keep up the supply, which must be confined exclusively to the older fish returning in their vain attempt to find spawning beds. At the expiration of six or eight years at farthest, the supply will probably cease entirely, and there will be no further run of such fish in said river.

In the event of the removal of such obstruction or the introduction of a fish-way, or planting the young fish above the former obstruction, the mature fish may be expected to make their appearance again at the end of three or four years.

The Code of "Public General Laws" of the State, as well as of the "Public Local Laws," makes it incumbent on all persons constructing dams on all rivers in the State, where fish are accustomed to pass up or down, to erect fish-ladders or fish-

ways, so arranged as to permit the fish to pass over said dams and up said stream to their spawning grounds. It has been suggested that a salutary law in this behalf might be enacted by the Legislature, giving supervision and jurisdiction over this matter to the constabulary force of each county, making it compulsory for them to report any infringements of the law to the Fish Commission and to the Court of the county in which such dams are located, as it seems to be impracticable for the Commissioners of Fisheries to give that attention to the subject as contemplated by section 80 of the Code of Public General Laws.

That fish of many varieties have decreased is no longer a question. Many streams that formerly furnished vast quantities of food, within easy reach, have now become almost unproductive, and it is only by a combination of measures of artificial propagation and distribution in such rivers and judicious legislative enactments that anything like the earlier experiences can ever be again realized and sustained. The causes of this variation in abundance are both the natural and uncontrollable; and the artificial, or those connected with the devices invented for their capture. When the natural alone are responsible there may be some hope of a return to original abundance. These natural causes of variation are two-fold, those induced by physical conditions and the dependence of the fish upon, or the relation of fishes to, their fellow-inhabitants of the same region.

The artificial causes are direct or indirect. The direct relate to those of over-fishing and the pollution of the water. The indirect consists of the obstructions placed by man to the movements of the fish; the disturbance of the balance of nature, by unduly fostering or destroying certain varieties of fish; or by breaking up of the schools of fishes during a critical period of their lives and preventing their spawning on their own selected ground.

Marshall McDonald, late United States Fish Commissioner, in speaking of the spawning and breeding grounds of the shad in the Potomac, states that—

“The Great falls have always stood as an insuperable barrier to the further upward migration of not only the shad and herring, but also of the more enterprising species, the rock fish or striped bass. The fisheries of this river annually decreased in value and production up to the time of the war; the intermission which then ensued in the fishing operations allowed the fisheries to recuperate, so that in the years immediately succeeding the war, it was found that they had in a measure recovered from

their former depletion. In 1878, the minimum of production was attained, during which season less than 200,000 shad were taken in the entire river. In 1879, the results of previous *artificial propagation* first manifested themselves, and there was a considerable increase in the run of shad, from which time the shad fisheries steadily increased, etc."

Your attention and that of the Legislature is respectfully invited to an article which appeared in the Washington Evening Star, in its issue of November 25, 1895, as follows:

TO PROTECT THE BASS.

A MEETING OF DELEGATES FROM MARYLAND, VIRGINIA AND WEST VIRGINIA.

A Bill to Be Presented to the Legislatures of the Three States—A Close Season for Black Bass.

There was a meeting of rod and gun clubs of Maryland and Virginia and other persons in those states and in West Virginia interested in fishing on the Potomac Saturday afternoon at the club house of the Blue Ridge Rod and Gun Club, near Harper's Ferry. The meeting was the result of a call issued by the Maryland State Game and Fish Protective Association of Baltimore. The circular said: "The Maryland Game and Fish Protective Association has for some time had under consideration the best means for the better protection of black bass in the Potomac river, and, after a very thorough investigation of the subject, is convinced that it is absolutely necessary for Maryland, Virginia and West Virginia, to agree upon a uniform law regulating the catching of bass in the Potomac, and then have the law agreed upon enacted by the Legislatures of the respective States."

Judge Edward Stake, of Hagerstown, was elected president and Dr. George W. Massamore, of Baltimore, secretary. Judge Stake, in calling the meeting to order, stated that it was absolutely necessary that some steps be taken, at an early day, restricting the methods of catching the bass in the Potomac, and prescribing a close season during the spawning period to prevent the depletion of the bass supply in the Potomac river. He explained, in a few words, that under an agreement between Maryland and Virginia in 1786 no legislation enacted in either state could become operative unless similar action should be taken by the legislature of the other state; that the agreement had never been rescinded, and assuming that the State of West Virginia had inherited all the State rights of Virginia when she became a State; it was, therefore, absolutely necessary that the meeting should agree upon only such proposed legislation as would be acceptable to all these States alike. With this in view, he said, it was advisable to form the simplest law possible, containing the general provisions for the protection of bass in the Potomac, omitting all points which might be desired by anglers in one State, but at the same time be counter to existing statutes in the other States.

There was a very general discussion of the subject by the delegates present, resulting in the framing of the following bill, which was unanimously adopted:

THE BILL ADOPTED.

It shall not be lawful for any person to catch or kill any black bass, green bass, willow bass, rock bass, pike or pickerel, or wall-eyed pike (commonly known as salmon) in the Potomac river and its tributaries,

between the fifteenth day of April and the first day of June of each year; nor shall catch or kill any of said species of fish at any other time during the year, save only with a rod, hook and line, or dip-net.

Any person violating the provisions of this act shall be guilty of a misdemeanor, and shall be punished, on conviction, by imprisonment in the county jail not exceeding six months, or by a fine not exceeding two hundred dollars (\$200), or by both fine and imprisonment; and it shall be the duty of the court, at any session of the grand jury, to call its attention to the provisions of this law.

The provisions of this law shall not apply to the Potomac river or its tributaries below the Little Falls, near Washington, and will apply to the Potomac.

The organizations represented were appointed as a committee to see that the above bill was proposed in the Legislatures of the respective States; and Internal Revenue Commissioner Miller agreed to see personally that the bill should be introduced, and a strong effort made to see that it passed the Legislature of West Virginia, which is the first one to meet.

REFUSE FROM THE MILLS.

A subject which came up during the discussion upon the provisions of the above bill, was the refuse from the pulp and other mills at and above Harper's Ferry, which is turned into the Potomac river, thereby injuring the fishing and the water supply of Washington. The subject was promptly excluded from the provisions of the proposed bill, and its discussion postponed until after the bill was framed, and when the matter came up subsequently, it was pointed out by those who had looked into the matter that a mill at Williamsport made provisions for burning the refuse, instead of turning it into the river, and that other mill companies, if their attention was called to the matter, would doubtless be equally public spirited and follow the example of the Williamsport mill. A resolution was thereupon unanimously passed to that effect, and efforts will be made to secure the co-operation of the various mill companies in putting a stop to this injury to fishing and taint to the water supply.

THE DELEGATES PRESENT.

The following delegates were present at the meeting: Dr. W. S. Harban, John W. Macartney, James P. Willett, Rudolph Kauffmann, W. G. Sterrett, W. D. Rudy, C. A. Shafer, from the Woodmont and Blue Ridge clubs; Dr. G. W. Massamore and C. S. Schermerhorn, from the Maryland Fish and Game Protective Association of Baltimore; Internal Revenue Commissioner, Joseph S. Miller, H. S. Dandridge and Dr. A. S. Reynolds, of Shepherdstown, representing West Virginia; Judge Edward Stake and William H. Armstrong of Hagerstown, Maryland; Dr. G. H. Edwards and J. G. McClellan, of Weverton, Maryland; Charles F. Nelson, of Winchester, and J. J. Crimm, of Harper's Ferry.

The black bass is not indigenous to the Potomac river, and none were ever found in it until about the year 1875, when Prof. S. F. Baird, U. S. Fish Commissioner, placed a half a dozen adult fish of that variety in the river and in an incredibly short time it was found that the Potomac, with the exception of St. John's river, Florida, was the most prolific in black bass of any stream in the United States.

More than fifteen years ago, the fishing for black bass, over an extent of one hundred miles, for market as well as for sport, was unrivaled anywhere; and now it has become absolutely necessary that there shall be better protection of black bass in the Potomac river, and we heartily concur in the movement inaugurated by this meeting and cordially commend the legislation proposed in the bill adopted by that meeting. We are pleased to learn that in the discussion, the subject of the refuse from mills was introduced and the fact made known that a mill at Williamsport had made provision for burning its refuse instead of turning it into the river, and that other mills, if their attention was called to the matter, would doubtless be equally public spirited and follow the example of the Williamsport mill.

The pollution of rivers is one of the vital questions that must come up for consideration for the protection of all food-fishes and should be prohibited or controlled.

The present limit of the upward movement of shad in the Susquehanna, if we are rightly informed, is Columbia, situated about 40 miles above tide-water, where the dam, some seven feet high constitutes an effectual barrier to their passage; herring do not ascend even that high—Bald Friar Ferry, a few miles above tide-water, being their limit.

Attention is again invited to an appeal made by the Fish Commission of Pennsylvania, in their annual report for 1888 to 1891 (page 5), to the Maryland Fish Commissioners, to suppress those devices that act against the best interests of both States in retarding the progress of fish propagation, and which emasculate the efforts of the United States and Pennsylvania Commissions in stocking the Susquehanna with fish that are destroyed in its lower reaches by nuisances that are practically legalized by Maryland; alleging that if the Susquehanna is again to be made as great a shad-producing river as the Delaware, the *fish baskets*, that destroy the young shad on their passage down to the sea, should be thoroughly eradicated. The appeal is made that prompt measures be taken to abolish these fish-baskets that are so prejudicial to the fish-producing interests of both States; for the Susquehanna, like the Delaware river, is the temporary home of the young fish, that, when mature, fill every inlet and estuary of the Chesapeake; that if the numbers of these fish are lessened in the future by the said causes, as they have been decreased in the past few years, the shad fisheries of Maryland, as well as those of the Susquehanna will soon cease, they allege, to be productive.

The manifest decrease of the supply of fish furnished by the Susquehanna having aroused public attention in 1866, a convention met in Harrisburg to consider the cause thereof, when an act was prepared requiring fish-ways to be constructed in all the dams upon the Susquehanna and its tributaries, which became a law March 30, 1866, and large sums of money were appropriated and used by that State from year to year, for the construction of fish-ways at certain points on said river and tributaries, the Roger's fish-ways, a simple, durable, efficient and comparatively inexpensive Nova Scotian invention, having been adopted by the State in 1835, so that it is now in contemplation to supply all dams in that State with these fish-ways. It is as little as Maryland could do, in our opinion, to lend its aid, as has been suggested, in protecting the young fish in their seaward course.

While it is true that only fourteen miles of the waters of the Susquehanna flow through the State of Maryland into the Chesapeake bay, yet it is a courtesy that one State should extend to another, not to place knowingly any impediment in the way of that State, in its endeavor to utilize that portion of the waters of the Susquehanna and its tributaries, that cover an extent of 635 miles within its limits, by permitting such nuisances to continue as have been complained of, and as "practically legalized by Maryland," as they believe and affirm.

It must be remembered that the shad and other anadromous food-fishes must traverse the Maryland portion of the Susquehanna to reach their natural spawning grounds that lie within the limits of the State of Pennsylvania; that it is true that the spawning grounds of these food fishes within the Maryland portion of said river are comprised within a very limited compass, wholly inadequate to the requirements of these fishes; and it is now a well-established theory that these food fishes will not return to waters so deficient in spawning area. It is well, therefore, to remember, in considering this subject in its relations to the benefits to accrue to Pennsylvania that Maryland, too, has an equal, if not greater interest in the enlargement of the spawning grounds of the shad; for as these are increased in the same ratio, may we anticipate an increased supply of the matured fish. We, therefore, respectfully recommend that the attention of the Legislature be invited to this particular subject, and that proper laws be enacted for the suppression of the nuisance complained of, by prohibiting with penalties, the construction or use of any such fish-baskets in the waters of the Susquehanna, within this State, at any season of the year.

We heartily concur in the views of the Pennsylvania Commissioners, who declare that—

The deadly fish-basket has played its part in the wanton destruction of fishes of nearly every kind, and is worthy of the most severe condemnation. Its long arms or wings of stone, reaching from the basket in or near the middle of the stream, in an upward direction on either side towards the shores, gather in every living creature carried by the current. A slight blow that will displace a scale will cause the death of these delicate little fish, and scarcely a young shad which succeeds in passing through the slats of the basket will live, while millions are caught upon the basket and there left to die.

On the subject of fish-ways, Major T. B. Ferguson, in his report for the year, 1880, page XII, writes:

Having demonstrated the efficiency of the means employed to increase the yield of shad and other migratory fishes, it has now become essential to the thorough success of the work and for the distribution of its benefits to all parts of the State, that means be provided for the ascent of fish to localities from which they are now debarred by natural and artificial obstructions. Although there are no such obstructions in the Susquehanna within the limits of this State, yet the work of re-stocking the river proper, and of increasing the supply of fish at its mouth, would be very materially assisted by opening the river to its sources, as this would not only enlarge the spawning grounds to a proportionate and very considerable extent, but would at the same time, afford more and better opportunities for the capture of ripe fish.

The construction of proper fish-ways in the river in Pennsylvania, and the discontinuance of the use of fish-weirs along the entire length of the river, would very quickly yield the best results to the citizens of both States.

Fish are no longer looked upon as spontaneous and inexhaustible products of the waters, and the desire for their protection that they may be tributary to our comfort and a never-failing means of supply, has been the subject of more thoughtful consideration than ever heretofore. Thus, hand in hand with fish-culture, should come intelligent and systematic protection so necessary for its success.

In the propagation of trout, which has been carried on extensively at the Druid Hill Park station, we find that it requires something more than a good spring of cool water to successfully start a trout farm. There must be large and never-failing springs of cool water, but cheap food must be convenient, and the whole must be under constant, intelligent management. In choosing the location of a trout farm, there are other important considerations, such as a proper amount of fall to the water in order to control it and give it aeration between the

ponds, and a formation that will allow all surface water to be led aside and not to enter the ponds.

A trout under a year old feeds mainly on insects and their larvæ in the state of nature, but a large trout of two pounds weight prefers something more substantial.

The State Commissioners of Fisheries, however, cannot undertake to carry on such trout farms, but must be content to hatch the fish and distribute them among those citizens of the State who show a sufficient interest in their culture as to place them in suitable streams where the conditions are favorable to their finding sufficient food for their sustenance and growth. In following up this system it is necessary, however, to provide spawning races for the adults and follow the rules of hatching the eggs and turning over the product for distribution either as fry or yearlings, the latter giving the best results and more sought after by applicants, but more expensive to the State. A spring brook that retains a temperature not above seventy degrees should always be selected to secure the best results. A shallow, warm, sluggish stream, should never be selected for trout production and growth.

Brook trout usually spawn from November to January in the early part of the day, while lake or salmon trout spawn at night. One of the most, if not the most successful hatcheries is located at Cold Spring Harbor, Long Island, constructed by Fred Mather for the Fishery Commission of the State of New York, where the object of the ponds is not only to grow trout, but to get the greatest amount of eggs for hatching, in order to stock the public waters of the State with the different species of trout. The ripe males are put into one tub and the ripe females in another, and those not ready to spawn in a day or two are put back into the pond. To judge whether a fish is ripe, one must depend upon the swollen vent and the softness of the abdomen. This is the first test; the next is the ready flow of eggs. A ripe male is known by its slim body and bright color.

In nature not more than forty per cent. of the eggs of trout are impregnated, owing to the failure of the milt to reach all the eggs, and of those that are impregnated fully one-half are killed by the fungus that grows rapidly on the dead infertile eggs, and by depredations by eels and other predaceous fishes. In artificial propagation, the contact of milt and eggs is so close that the impregnation amounts to about ninety-five per cent., with no loss from fungus or depredation.

The so-called "dry method" of stripping trout, which Mr. Mathers says is the best, he described as follows, viz :

"A pan is wet and the water drained from it. The eggs of the female are taken by repeated strokes of the forefinger, if the trout is small, or by the hand if large—the stroke being near the vent and then worked farther up toward the head. A male is then stripped over the eggs, and water enough to cover them is added, after which they are left to stand until they 'free.' The eggs are soft as they leave the fish, and for twenty minutes or more they absorb the milt and water, and while doing this they adhere to the pan, but become free when filled. They should not be disturbed until free, when they should be washed by changing water, and then placed on trays in the troughs. If an egg is not impregnated before it fills with water, it can never be fertilized. The advantage, says Mr. Mather, of the 'dry method' over taking the eggs in a pan of water, is, that each egg is brought in contact with the milt, which suddenly becomes active when it comes in contact with water."

Byron Close, superintendent of the Nevada Hatchery, whose percentage of ripe eggs and healthy fry gives him a worthy and authoritative place among fish-breeders, however, states that the best method for stripping trout is as follows:

With the left hand grasp the fish firmly around the back of the head, leaving the belly free and fronting to the right, then with the thumb of the right hand gently press and move from gills toward the fundament, the fundament portion of the fish to be under water, so that the eggs will not be exposed to the open air. If the fish thus in hand is ripe for stripping, the eggs will flow freely; and after one or two slides of the thumb the fish may be returned, with no injury, to the open pond. The male fish is handled immediately in the same way, at which time the water in the pan should be agitated, thus securing a perfect impregnation of all the eggs. The eggs are then ready for transportation to the hatchery. These eggs are inspected at least once a day, and all diseased eggs are removed. After the umbilical sac becomes detached, feeding may commence. Cold boiled liver grated fine will answer. Small quantities of sour milk is also used.

When first hatched the embryo trout hardly look like fish, they have simply crust of shell in which they appear as a slim dark body, with big eyes, coiled around a yolk; while the great yolk-sac remains attached they are so heavy that they cannot swim, but must lie on their sides and huddle together to avoid the light. When they are a month old the sac will be nearly gone, and the fry will begin to show signs of swimming by occasional darts from the bottom to examine some floating particle. They will take food some days before the sac is absorbed, and it should be offered to them in small quantities.

The best food for trout, Mr. Mather says, is beef liver, fed raw; for the "babies" it is cut very fine with a meat cutter, increasing the size of the bits as the fishes grow. This is mixed with sufficient water and little by little scattered along the troughs, taking care not to feed so much at once that it will not be eaten.

To take trout eggs and hatch them is not so difficult, but "the best trout breeder," says Mr. Mather, "is the one who brings the greatest percentage of what he has hatched to be thrifty fish at six months old."

Too much importance cannot be attached to the feeding of the fry in the early days of their taking food. It is the critical time, not only of their lives, but for their future development. No amount of feeding can make a thrifty trout of one which has been stunted by scant food in its first few months of life.

Mr. Mather, in the October number, 1895, of the "Popular Science Monthly," gives a minute description of how to prepare the artificial pond and hatchling troughs of a model trout farm, as well, as an account of the ingenious device in which to breed young fish, patented by Mr. Hoxsie and used at Honeoye Falls, New York.

The natural history of the herring, has, perhaps, been less thoroughly understood than that of any other of our important food fishes.

Pennant was the first to construct a theory with reference to the movement of the herring. His theory, which was based largely upon the traditional ideas of the fishermen, was that the herring lived in the Arctic seas during the greater portion of the year, where they found an abundance of suitable food, and were entirely free from the ravages of the numerous enemies which preyed upon them in the more southern latitudes; that at certain seasons of the year large schools gathered from the surrounding waters and soon started on their annual migration to the shores of Europe and America.

This theory was generally accepted for many years, and it was not until about 1854 that it was overthrown by a more rational one. At this time, Mr. Cleghorn, of Wick, Scotland, published a paper containing his ideas of the movements of the herring. Mr. Cleghorn's theory, briefly stated, was that the herring is a permanent resident of the waters which it inhabits, and that it never migrates to any distance from a given locality; that distinct races exist on different portions of the coast; that the catch is much smaller; that the yield of the

fisheries gradually increased up to a certain point, after which it began to fluctuate and soon rapidly decreased, so that many stations once prosperous were abandoned, etc.

From these premises he reaches the conclusions that the former fluctuations and recent decrease in the yield was due to *over-fishing*.

So much has been written on the subject that it is even now in confusion, many believing that the herring exists in distinct races which arrive at maturity, month after month, and that the herring taken at Wick, Scotland, in July, are quite different from those taken at Dunbar in August or September. (See Bertram's *Harvest of the Sea*, page 164).

American writers, however, recognize but one species of herring, from the coast of Labrador on the north to Cape Cod and North Carolina on the south.

In former times, both rock and perch were much more abundant than at present; the fishermen, while agreeing in a general statement as to the abundance of fish in other days, look forward to the future with considerable apprehension, predicting a still greater decrease in the number of such fish than has already taken place. It is within the memory of those still living, when fishermen used to haul large quantities of rock and perch in their seines, getting frequently more than they could find sale for; and the question with them then was how to secure them until a sale could be made.

Weirs made of small pine slats, interwoven with oak splints, forming a sort of basket work, driven into the mud, reaching from the shore to water six feet in depth at the outer end, were mostly used up to twenty-five years ago in catching rock and perch. The fact is "a fish never turns a corner." Now, however, they are caught almost exclusively with seines and nets.

The plan adopted by the several Commissioners of Fisheries of this State and pursued by the present Commissioners, to maintain and to increase the supply of the best food-fishes, has been to establish fish-cultural stations on the Tuckahoe, a tributary of the Choptank, the Nanticoke and Wicomico rivers, and at Druid Hill Park, where all eggs that might be procured could be impregnated and hatched, and when the young fry was old enough to take proper care of itself to distribute it in those streams nearest the stations that gave most satisfactory evidence of adaptation to their support and growth, or to such streams as indicated a decrease or were notably deficient in a supply of the finer varieties of food-fish, of

which the State abounded, while the surplus was distributed in those streams whence the eggs were procured.

The operations of the Commissioners for the two seasons last past as indicated by the schedules which accompany this report, show a slight decrease in the quantity of eggs obtained and of fish distributed as compared with the two former seasons of our administration, which were unusually successful ones.

From these reports it will be seen that there were secured at the Tuckahoe or Choptank station in April and May 1894, under the supervision of Mr. Hughlett, 1678 shad, from the spawn of which 41,950,000 eggs were obtained, and 30,600,000 young shad were distributed in the waters of Caroline, Cecil, Dorchester, Kent, Queen Anne's and Talbot counties.

There were secured at the Sharptown, or Nanticoke station, by Mr. Mann, in the season of 1894, 209 shad, from which 5,225,000 eggs were obtained, and 4,700,000 young shad distributed in Laurel, Marsh, Hope and Nanticoke rivers, and their tributaries. Besides this distribution of shad, Mr. Mann distributed in the Nanticoke river and Plumb creek the same season, 3,550,000 young herring.

There were secured at the Salisbury station on Wicomico river by Mr. Trader, in the season of 1894, 202 shad, from which 5,050,000 eggs were obtained, and 4,775,000 young shad distributed in the waters of the Manokin, Pocomoke, St. Martin's and Wicomico rivers and tributaries.

From the Druid Hill Park station there were hatched and distributed in the season of 1894, by Mr. Delawder, the superintendent, to sundry citizens 212,150 brood trout, to be placed in the streams and brooks of Allegany, Baltimore, Carroll, Cecil, Frederick and Garrett counties; there were also distributed by Mr. Delawder, through Mr. Robert Seneca, 2,150,000 young shad in Bush, Gunpowder, Patapsco, and Susquehanna rivers. There were distributed by and under the direction of Commissioner Browning 1,000 carp to sundry applicants, to be deposited in private ponds and in other waters in Allegany, Anne Arundel, Baltimore and Garrett counties.

There were secured at the Tuckahoe, or Choptank station, by Mr. Hughlett, in 1895, 2,085 shad, a larger number than was handled by him in the prosperous season of 1893, from the spawn of which 52,125,000 eggs were obtained, and 34,500,000 young shad were distributed in the waters of Caroline, Cecil, Dorchester, Kent, Queen Anne's and Talbot counties.

Mr. Mann, in charge of the Sharptown or Nanticoke station this year, from the 268 ripe shad obtained, impregnated 6,700,000 eggs, from which was hatched and distributed 6,075,000 young shad in the Nanticoke river and its tributaries, viz: Barren creek, Laurel river, Marsh Hope and Plumb creeks. Beside this distribution of shad, Mr. Mann has distributed 3,175,000 young herring at Sharptown and in Plumb creek.

Mr. Trader, of the Salisbury, or Wicomico station, secured this year 246 ripe shad, from which he obtained 6,150,000 eggs, and therefrom hatched and distributed 4,685,000 young shad, in the Pocomoke, St. Martin's and Wicomico rivers.

Mr. Jacob H. Plowman, of the Druid Hill Park station, who succeeded Mr. Delawder, this year hatched and distributed 75,400 brook trout to sundry applicants, to be deposited in the streams and brooks of Allegany, Baltimore, Carroll, Cecil, Frederick, Garrett and Harford counties. There were also distributed from this station this year by Mr. Seneca, 1,250,000 young shad in the Bush, Gunpowder and Susquehanna rivers; and by commissioner Browning 100,000 young shad in the Bush river, Harford county; and 775 carp to sundry applicants, in Allegany, Garrett, Montgomery and Wicomico counties.

More attention was given this year to the propagation and distribution of white perch than has ever heretofore been given to the culture of this variety of fish. The result has been satisfactory in the highest degree, and it is especially gratifying, as the white perch is a fish that furnishes food to our citizens all the year round, and properly propagated and protected may furnish profitable employment to our fishermen the whole year. Of this fish there were secured at the Choptank or Tuckahoe station, by Mr. Hughlett, 1600 perch, from which 48,000,000 eggs were obtained, and 32,000,000 young perch hatched and distributed in the waters of the Big Annemessex and Manokin rivers in Somerset county, and in the waters of the Choptank and Little Blackwater in Dorchester county. There were secured at the Sharptown or Nanticoke station, by Mr. Mann, 59 perch, from the eggs of which 1,325,000 young fish were hatched and distributed in the waters of the Nanticoke river and its tributaries.

The total distribution of fish by the Commissioners for the year 1894, was 42,225,000 young shad, 3,550,000 young herring, 212,150 brook trout and 1,000 carp; and for the year 1895, there

were distributed by the commissioners, 46,710,000 young shad, 3,175,000 young herring, 75,400 young trout, 775 carp and 33,325,000 young white perch, making a total distribution for the two years of our administration 88,935,000 young shad, 6,725,000 young herring, 287,550 young trout, 1,775 carp, and 33,325,000 young white perch, aggregating a grand total of 129,274,325 fish of all kinds, the largest distribution yet made of all kinds in any two years since the inauguration and establishment of the fish hatcheries by the State twenty years ago, and at a cost to the State of only \$21,000. Who shall attempt to place an estimate of the future valuation of these two years of fish-culture to the fishermen of the State and of wealth to the citizens of the State generally? Suffice it to say that its results, judged by the increased productiveness of this industry in the past ten years, should place the enterprise, no longer tentative, upon a firm and permanent basis; and the liberal encouragement of the Legislature is not only solicited but most earnestly recommended in that behalf.

The schedules that accompany this report, giving the number of eggs obtained, the number of fish hatched, when and where distributed; and in the case of trout and carp, the names of applicants to whom the fish have been delivered for distribution and the streams of water where deposited, are furnished to meet the demands of the public for information as to the result of the State's annual appropriation for the development of this important industry.

We are pleased to note here that the fishermen generally have in a great measure, and in many ways aided the commission in the prosecution of its work and in supplying the superintendents with ripe shad for the several fish-cultural stations. The same gentlemen, except that Mr. Jacob H. Plowman the past year succeeded Mr. Delawder as superintendent at Druid Hill Park station, have had charge of these stations the past two years, and are well prepared practically to perform the duties of their office. The weather of the past two years has not been as favorable to the propagation of shad as in 1892 and 1893, which were exceptionally successful seasons, but by reason of their constant application to duty and a persistent determination not to allow, if possible, a diminution of supply, we have been able to report satisfactory results all along the line, and as respects numbers of all kinds of fish, the past two years have led all others in fish-culture. Our superintendents have been, without exception, very efficient

in the performance of every duty imposed upon them, connected with their respective stations, and whatever of success we have made of the trust committed to our hands by your confidence and appointment, we owe in a large measure to the aid these gentlemen have so generously rendered us in that behalf.

The Commissioners have not propagated German carp very extensively the past two years for the reason that the waters of the State abounded in food-fishes of more inviting delicacy and more desirable qualities. A moderate quantity however, has been propagated at the Druid Hill Park station to meet the demands of applicants in supplying private ponds or inland waters, relying on the United States Fish Commission to meet the few demands that might be made on the State in excess of its supply.

The great success attained the past year in the propagation of white perch emboldens us to commend this particular industry to those upon whom may rest the responsibility of developing future plans for the protection and propagation of food-fishes in the waters of this State.

Fish-culture, doubtless, as a means of restoring the native fish to their original number and quality, in its developement, has come to be the principal agency for maintaining and upholding so important an industry in this State, although much must depend upon the Legislature of the State in controlling and directing the means used to trap and catch the fish when mature. When we consider how many appliances have been devised and are being used to entrap these food-fishes on their way to their spawning grounds, there is no wonder that so few succeed in reaching them.

The remedy must be found in the proper regulation of the fishing, and must be dependent on systematic, regular and rational methods of propagation and protection, based upon a careful study of the environments and habits of the several food-fishes and the conduct of fish-cultural operations.

The period in which shad hatching operations can be profitably and successfully carried on in Maryland waters, is limited by the condition and temperature of the water to about eight weeks, extending from the middle of April, the time when the first ripe fish are taken, to the 10th of June, when the fishing season closes by law.

The commissioners have taken the pains to collect, by means of a circular letter; and the liberty to submit, in the appendix

to this report, a list of the Fish Commissioners of the several States and territories of the United States, the fish-cultural stations and their location, with the residences of said Commissioners and a list of the principal officers and superintendents of stations of the United States Fish Commission up to date.

We desire jointly to express our appreciation of the interest taken in the fish-cultural operations of the State, by the Honorable Herbert A. Gill, chief clerk and acting Commissioner of Fish and Fisheries of the United States, and to Mr. H. M. Smith, division assistant, for the prompt and cheerful manner in which they have furnished us information and suggestions as to the best method of conducting and prosecuting our work. We extend our thanks to the press of the State for the frequent and flattering mention made as to the methods of fish-culture and fish protection adopted by your representatives.

It is the settled opinion of a large proportion of the commercial fishermen that adequate and suitable laws should be enacted and enforced for the protection and judicious maintenance of the supply of the food-fishes of the State, and that these laws should be such as to disturb as little as possible the investments of those engaged in the fish industry that is consistent with the thorough and effective protection of the fish.

We should make our fishery laws more general, as to (1) the place of fishing, (2) the season, (3) the time of day, (4) the size and length of nets and the size of mesh, (5) the kind of fishing, (6) the distance apart of nets, weirs, pounds, etc., (7) the number and size of fish that may be taken, and (8) the police and regulation of the boats and men while engaged in this industry; and as far as possible abandon local legislation, such as that referred to in sections 10 and 27 of the Public General Laws relating to vessels sailing through seines, and the penalty therefor.

Let there be not only a fixed time for the whole State when there shall be a close season for each kind of food-fish, during which no fishing whatever should be allowed, which would mean "increase of stock, and prevention of glut of market." When fishing is allowed, the means by which fish are caught should be duly regulated by wholesome general legislation. Another most important point in this connection is the protection of the spawning grounds from pollution by the introduction of noxious substances.

RECOMMENDATIONS.

Having presented our report of the work accomplished by us in as clear and forcible a manner as the limited space of a biennial report would warrant, and having made such suggestions as have presented themselves to us in the performance of our duty as Fish Commissioners, in the propagation of food-fishes at the several hatching stations of the State, we therefore respectfully recommend that there be.

1. A careful revision of our laws for the judicious protection of our fish.

(a.) That so far as feasible, special legislation not applicable to all the waters of the State be discouraged.

(b.) That a general law for the protection of trout be enacted, fixing the size that might be lawfully taken from the waters of the State and sold in the market, at six inches, and providing penalties for taking or having in possession of less size.

(c.) That the size of the meshes of all nets and seines be fixed and limited by a general law.

(d.) That fish-ways should be constructed at all points where the passage of fish is obstructed. Dams on the smaller streams should be required to be constructed so as to admit the free passage of all food-fishes.

2. That the emptying of sewage or any substances deleterious to the life of food-fishes should be, as far as practicable, prohibited.

3. That all fishing, except with hook and line, for a fixed period in each and every year, should be forbidden.

4. That all small fish and others unfit for food because of immaturity, when taken in nets, weirs or seines, should be replaced in the water when taken alive, and that fishermen should not be allowed to take such fish ashore nor expose them for sale.

5. That all penalties fixed for violation of any laws that shall be enacted shall be made to apply not only to those who take the fish, but also to all persons who buy, sell, transport or have the same in possession.

6. That the destruction of young fish by improper means or modes of capture should be guardedly prohibited.

7. That a close season should be established, during which time all fishing with nets, seines or fixed apparatus should cease for thirty-six hours in each week, during the migration of anadromous fishes; that is to say, from 5 o'clock Saturday afternoon until 5 o'clock Monday morning, in order that an opportunity might be given such fishes of reaching their spawning ground, and when reached then to be permitted to remain undisturbed on their spawning beds. This close season should be vigorously watched and ample penalties should be imposed for any and every encroachment thereon, inasmuch as this is universally believed to be one of the important steps towards the preservation of our best and most desirable food-fishes.

8. That the catching of fish in the waters of the State, by means of large haul seines, and the taking away by this means of large quantities of fish by non-residents, should be positively prohibited by legislative enactment. Or, if allowed, a license tax should be imposed upon them of sufficient amount as virtually to suppress the depredation.

As required by section 89 of the Code of Public General Laws as amended by chapter 189, Act of 1890, each commissioner has annually submitted to the Comptroller of the State a detailed statement of the receipts and expenditures of the moneys placed in his hands,

Nothing has been done during the past two years toward the destruction of eels in Wicomico river as required by sections 82-86 of the Code of Public General Laws, for the reason that the Commissioners were inhibited therefrom by the Acts of the Legislature at the January session, approved April 6, 1894, chapter 633, making appropriations for the support of the State government for the fiscal year ending September 30, 1896 (page 998), and chapter 654, making appropriations for the support of the State government for the fiscal year ending September 30, 1895 (page 1041), title "For Commissioners of Fisheries," which provide:

"For the salaries of the two Commissioners of Fisheries, fifteen hundred dollars each, three thousand dollars; and to defray the expenses of the Commissioners of Fisheries, as per acts of eighteen-hundred and seventy-six, chapter forty-seven, and per section eighty-nine of article XXXIX of the Code of Public General Laws, etc., seventy-five hundred dollars, or so much thereof as in the opinion of the Governor may be necessary; *no part of the said appropriation shall be expended*

for the killing of eels in Wicomico river, or in other waters of the State of Maryland,"

We would respectfully suggest and recommend that the Legislature make the usual appropriation of ten thousand dollars as stipulated by section 82 of the Code of Public General Laws, so long as said enactment remains the law of the State, or that the proviso of said section, requiring one-fourth of the appropriation to be used and expended in the catching and destroying of eels within the waters of the Wicomico river, be repealed.

We have the honor to be,

Very respectfully,

Your obedient servants,

JOHN S. SUDLER,

Commissioner for the Eastern Shore,

RICHARD T. BROWNING,

Commissioner for the Western Shore.

Deember, 1895.

APPENDIX "A."

SHOWING IN DETAIL THE DATE OF FISH STRIPPED, NUMBER OF EGGS
OBTAINED, NUMBER OF FISH HATCHED, WHERE DEPOSITED AND
NUMBER OF FRY DEPOSITED, FROM THE DIFFERENT STA-
TIONS IN MARYLAND FOR 1894 AND 1895; WITH
TABLE COVERING THE FISHERY STA-
TISTICS OF THE STATE, PREPAR-
ED BY THE U. S. FISH
COMMISSION.

DISTRIBUTION OF TROUT FROM THE DRUID HILL PARK STATION, BY R. T. BROWNING, COMMISSIONER, AND BY
L. W. DELAWDER, SUPERINTENDENT, FOR 1894.

DATE.	TO WHOM DELIVERED.	WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
March 22	Dr. Holmes Smith.....	Streams in Baltimore county.....	8,000
" 23	George Ortel.....	"	8,000
" 27	James Jackson.....	Streams in Baltimore county.....	5,000
" 27	J. Bingham.....	"	5,000
April 2	Dr. J. H. O'Donovan.....	"	10,000
" 6	Citizens of Garrett.....	" Garrett county.....	25,000
" 18	"	"	25,000
" 20	Wm. S. Myer.....	Pikesville, Baltimore county.....	5,000
" 20	Henry Milford.....	Lonaconing, Allegany county.....	20,000
" 20	Dr. William Lee.....	Streams in Baltimore county.....	5,000
" 23	Citizens of Garrett.....	" Garrett county.....	35,900
" 23	Capt. Cassell.....	" Baltimore county.....	10,000
May 3	James Amos.....	" Carroll county.....	5,000
" 7	S. A. Sweeney.....	" Baltimore county.....	7,000
" 12	Mrs. J. Lulan.....	"	5,000
" 13	Charles L. Carter.....	" Cecil county.....	10,000
" 14	Wm. Downey.....	" Frederick county.....	8,000
" 14	Thomas Holbs.....	Cumberland.....	4,000
" 14	Capt. Davis.....	Streams in Garrett county.....	10,000
Nov. 17	R. T. Browning.....	Lake Brown, Garrett county.....	1,500
" 23	Josiah Pennington.....	Streams in 10th District, Baltimore county.....	600
Dec. 21	"	Gwynn Oak dam, Baltimore county.....	50
			212,150

DISTRIBUTION OF CARP FROM THE DRUID HILL PARK STATION, BY R. T. BROWNING, COMMISSIONER, FOR 1894 AND 1895.

DATE.	TO WHOM DELIVERED.	WHERE DISTRIBUTED.	NUMBER.
1893			
Dec. 7	Wm. Snyder.....	Private pond.....	100
1894			
Nov. 23	Mr. Keller.....	Pond in Anne Arundel county.....	50
Dec. 5	George H. Johnson.....	" Baltimore county.....	50
" 5	Joseph Hostelder.....	Pond at Accident, Garrett county.....	75
" 5	M. K. Snyder and.....	Ponds at Barton, Allegany county.....	200
" 5	Dominic Arnold.....	Pond at Oakland, Garrett county.....	100
" 5	John McRoby.....	Oakland, Youghiogheny river.....	100
" 5	Thomas Carney.....	Pond in Baltimore county.....	50
" 5	Peter Nathan and.....	Pond at Frostburg, Allegany county.....	200
" 5	Aaron Wilhelm.....	Pond in Baltimore county.....	75
" 10	Mr. Gross.....	Pond at Burtonsville, Montgomery county.....	75
1895			
April	Wm. Rich.....	Ponds at Salisbury, Wicomico county.....	200
"	Wm. S. Parsons.....	Frostburg, Allegany county.....	150
"	Joshua Porter.....	Selbysport, Garrett county.....	150
"	C. C. Pike.....	" ".....	100
"	M. L. McRoby.....	Private pond.....	100
"	Theodore Luman.....		
			1,775

DISTRIBUTION OF SHAD FROM THE DRUID HILL PARK STATION, BY L. W.
DELAWDER, SUPERINTENDENT, AND BY ROBERT SENECA, OF
HAVRE DE GRACE, IN 1894.

LOCALITY.	NUMBER.
Bush river.....	800,000
Gunpowder river.....	100,000
Patapsco river.....	50,000
Susquehanna river.....	1,200,000
	<hr/>
	2,150,000

DISTRIBUTION OF SHAD FROM THE DRUID HILL PARK STATION, BY ROBERT
SENECA, OF HAVRE DE GRACE, DISTRIBUTING AGENT IN 1895.

LOCALITY.	NUMBER.
Bush river.....	200,000
Gunpowder river.....	50,000
Susquehanna river.....	1,100,000
	<hr/>
	1,350,000

May	2	97	2,425,000	1,750,000	May	9.	Millington, Chester river, Kent county.....	1,000,000
"	3	135	3,375,000	2,450,000	"	10.	Greensborough, Choptank river, Caroline county.	1,000,000
"	4	85	2,125,000	1,535,000	"	11.	Sylvester bridge, Watt's creek, branch of Choptank river, Caroline county.....	1,000,000
"	5	25	625,000	470,000	"	11	Drawbridge, Chicknamiacomico river, Dorchester county.....	1,000,000
"	7	75	1,875,000	1,350,000	"	12.	At hatching station.....	1,000,000
"	8	63	1,575,000	1,100,000	"	14.	"	2,000,000
"	9	37	925,000	700,000	"	16.	"	2,000,000
"	10	23	575,000	430,000	"	19.	"	2,600,000
"	11	19	475,000	355,000				
"	12	13	325,000	240,000				
"	14	53	1,325,000	925,000				
"	15	38	950,000	715,000				
"	16	27	675,000	500,000				
"	17	17	425,000	320,000				
		1,678	41,950,000	30,600,000				
				30,600,000				

RECORD OF SHAD HATCHING OPERATIONS AT SHARPTOWN (NANTICOKE STATION), FROM APRIL 10 TO MAY 25, 1894,
BY WALTER C. MANN, SUPERINTENDENT.

DATE.	SHAD STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
April 10	1	25,000	20,000		
" 12	5	125,000	110,000		
" 13	2	50,000	40,000		
" 16	3	75,000	70,000		
" 17	2	50,000	40,000		
" 18	9	225,000	210,000	April 17. Sharptown, Nanticoke river, Wicomico county..	125,000
" 19	12	300,000	275,000	" 19. Sharptown, Nanticoke river, Wicomico county..	50,000
" 20	4	100,000	90,000	" 26. Walnut Landing, Marsh Hope river	550,000
" 23	8	200,000	175,000	" 27. Plumb creek.....	100,000
" 24	16	400,000	365,000	" 30. Federalburg, Marsh Hope river, Caroline Co...	500,000
" 25	16	400,000	365,000	May 1. Laurel, Laurel river.....	675,000
" 26	12	300,000	275,000	" 5. Bethel, Laurel river.....	700,000
" 27	10	250,000	225,000	" 9. Marsh Hope.....	700,000
" 30	20	500,000	450,000	" 9. Plumb creek.....	25,000
May 2	17	425,000	400,000	" 14. Phillips' Seine Landing, Nanticoke river.....	300,000
" 3	15	375,000	330,000	" 16. Lucas Island.....	550,000
" 5	1	25,000	20,000	" 19. Ellis' Seine Landing.....	350,000
" 7	5	125,000	110,000	" 22. Shingle Landing	25,000
" 8	7	175,000	150,000	" 25. Sharptown.....	50,000
" 9	13	325,000	300,000		
" 10	9	225,000	210,000		
" 11	2	50,000	40,000		
" 12	4	100,000	90,000		
" 14	11	275,000	260,000		
" 15	2	50,000	40,000		
" 17	1	25,000	20,000		
" 21	2	50,000	20,000		
	209	5,225,000	4,710,000		4,700,000

RECORD OF HERRING-HATCHING OPERATIONS AT SHARPTOWN, (NANTICOKE STATION) FROM APRIL 9 TO APRIL 25,
1894, BY WALTER C. MANN, SUPERINTENDENT.

DATE.	HERRING STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
April 9	20	550,000	450,000		
" 10	16	400,000	350,000		
" 11	8	200,000	175,000		
" 12	13	325,000	300,000		
" 13	16	400,000	350,000		
" 16	21	525,000	450,000		
" 17	2	50,000	40,000		
" 18	19	475,000	425,000	April 15. Sharptown, Nanticoke river, Wicomico county..	800,000
" 19	12	300,000	275,000	" 19. Sharptown, Nanticoke river, Wicomico county..	800,000
" 20	1	25,000	20,000	" 23. Sharptown, Nanticoke river, Wicomico county..	550,000
" 21	16	400,000	350,000	" 25. Plumb creek	700,000
" 23	17	425,000	365,000	" 25. Sharptown, Nanticoke river, Wicomico county..	700,000
	161	4,025,000	3,550,000		3,550,000

RECORD OF SHAD-HATCHING OPERATIONS AT SALISBURY STATION, FROM APRIL 18 TO MAY 25, 1894, BY SYLVANUS
TRADER, SUPERINTENDENT.

DATE.	SHAD STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
April 18	4	100,000	95,000	April 25. Princess Anne, Manokin river, Somerset county.	250,000
" 19	10	250,000	235,000	" 30. Pocomoke river	500,000
" 20	6	150,000	142,000	May 1. Snow Hill, Pocomoke river, Worcester county..	600,000
" 21	12	300,000	285,000	" 2. Back Creek	250,000
" 24	14	350,000	332,000	" 4. Salisbury, Wicomico river, Wicomico county ..	250,000
" 25	5	125,000	118,000	" 7. St. Martin's river	500,000
" 26	19	475,000	450,000	" 8. Wicomico river	200,000
" 27	4	100,000	95,000	" 9. Wicomico river	175,000
" 28	4	100,000	95,000	" 10. Wicomico river	250,000
" 30	15	375,000	354,000	" 11. Wicomico river	175,000
May 1	10	250,000	235,000	" 12. Wicomico river	125,000
" 2	7	175,000	165,000	" 13. Wicomico river	175,000
" 3	10	250,000	235,000	" 15. Tony Tank creek, Wicomico county	300,000
" 4	7	175,000	165,000	" 16. Wicomico river	50,000
" 5	5	125,000	118,000	" 17. Wicomico river	175,000
" 8	7	175,000	165,000	" 18. Wicomico river	75,000
" 9	12	300,000	285,000	" 20. Wicomico river	250,000
" 10	2	50,000	47,000	" 21. Wicomico river	150,000
" 11	8	200,000	190,000	" 23. Wicomico river	175,000
" 12	4	100,000	95,000	" 24. Wicomico river	100,000
" 15	10	250,000	235,000	" 25. Wicomico river	50,000
" 16	7	175,000	165,000		
" 17	6	150,000	142,000		
" 18	8	200,000	190,000		
" 21	6	150,000	142,000		
	202	5,050,000	4,775,000		4,775,000

RECORD OF SHAD-HATCHING OPERATIONS AT TUCKAHOE STATION, FROM APRIL 18 TO MAY 15, 1895, BY THOMAS
HUGHLETT, JR., SUPERINTENDENT.

DATE.	SHAD STRIPPED.	Eggs OBTAINED.	Eggs HATCHED.	WHEN AND WHERE DISTRIBUTED.	No. Fry DEPOSITED.
April 8	17	425,000	285,000	April 19. Lloyd's branch, tributary to Tuckahoe river, be- tween Talbot and Queen Anne's counties. ...	1,000,000
" 9	40	1,000,000	650,000	" 19. At Maple dam bridge, Little Blackwater river, Dorchester county..	1,000,000
" 10	36	900,000	600,000	" 22. At Brick Mills, Choptank river. Caroline county.	1,000,000
" 11	19	475,000	300,000	" 23. At Wye Mills, Wye river, Talbot county.....	1,000,000
" 12	15	375,000	240,000	" 24. At Watts' creek, tributary of Choptank river, Caroline county.	1,000,000
" 13	11	275,000	175,000	" 25. At Horse-shoe bend, Choptank river, Caroline Co.	1,000,000
" 15	50	1,250,000	820,000	" 26. At King's creek, tributary of Choptank river, Talbot county	1,000,000
" 16	35	875,000	670,000	" 26. At Beaver dam bridge, Big Blackwater river, Dorchester county.....	1,000,000
" 17	27	675,000	440,000	" 27. At Moore's Mill, tributary of Tuckahoe creek, Talbot county.....	1,000,000
" 18	23	575,000	370,000	" 29. At Carter's bridge, at the extreme head of Chop- tank river, between Maryland and Delaware...	1,000,000
" 19	21	525,000	350,000	" 30. At Centreville flouring mills, Corsica creek, Queen Anne's county.....	2,000,000
" 20	17	425,000	275,000	May 1. At North East, North East river, Cecil county..	1,000,000
" 22	142	3,550,000	2,340,000	" 2. At Millington, Chester river, Kent county.....	1,000,000
" 23	75	1,875,000	1,250,000	" 3. At Greensboro, Choptank river, Caroline county.	1,000,000
" 24	133	3,300,000	2,175,000	" 4. At Federalsburg, Northwest fork of Nanticoke river, Caroline county.....	1,500,000
" 25	120	3,000,000	2,000,000		
" 26	76	1,900,000	1,250,000		
" 27	50	1,250,000	820,000		
April 29	135	3,375,000	2,225,000		
" 30	133	3,325,000	2,200,000		
May 1	83	2,075,000	1,350,000		
" 2	67	1,675,000	1,100,000		
" 3	55	1,375,000	900,000		
" 4	48	1,200,000	800,000		

RECORD OF SHAD-HATCHING OPERATIONS AT TUCKAHOE STATION—Continued.

DATE.	SHAD STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
May 6	225	5,625,000	3,675,000	6. At Tanyard bridge, Tred Avon river, Talbot Co.	1,000,000
" 7	150	3,750,000	2,500,000	6. At Eureka Mills, Miles river, Talbot county.....	1,000,000
" 8	100	2,500,000	1,640,000	7. At Red bridge, Elm river, Cecil county.....	1,000,000
" 9	87	2,175,000	1,450,000	8. At Chestertown, Chester river, Kent county.....	1,000,000
" 10	59	1,475,000	1,050,000	10. At Airey's, Transquakin river, Dorchester county.	1,000,000
" 11	37	925,000	600,000	11. At Hatching station.	4,000,000
				13. At Murphy's Mills, Bohemia rivet, Cecil county.	1,000,000
				13. At Foxhole, Sassafras river, Cecil county.	1,000,000
				14. At Hatching station.....	4,000,000
				15. At New bridge, Chicknamacomico river, Dorches-	1,000,000
				ter county.....	2,000,000
				" 15. At Hatching station....	34,500,000
	2,085	52,125,000	34,500,000		

RECORD OF SHAD HATCHING OPERATIONS AT SHARPTOWN (NANTICOKE STATION), FROM APRIL 15 TO MAY 27, 1895,
BY WALTER C. MANN, SUPERINTENDENT.

DATE.	SHAD STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DEPOSITED.	NO. FRY DEPOSITED.
April 15	6	150,000	135,000	April 22. At Riverton, Nanticoke river.....	300,000
" 16	8	200,000	180,000	" 24. At Barren creek, Wicomico county.....	300,000
" 18	5	125,000	115,000	" 27. At Laurel, Laurel river.....	900,000
" 19	9	225,000	200,000	" 29. At Portsville, Laurel river.....	600,000
" 22	23	550,000	520,000	" 29. At Plumb creek.....	475,000
" 23	18	450,000	410,000	May 6. At Federalsburg, Marsh Hope river.....	500,000
" 24	10	250,000	225,000	" 8. At Plumb Creek bridge.....	200,000
" 25	15	375,000	345,000	" 10. At Wright's wharf, Marsh Hope river.....	900,000
" 26	19	475,000	425,000	" 11. At Sharptown, Nanticoke river.....	75,000
" 29	9	225,000	200,000	" 13. At Plumb Creek bridge, Nanticoke river.....	450,000
" 30	12	300,000	270,000	" 18. At Sharptown, Nanticoke river.....	275,000
May 2	8	200,000	180,000	" 20. At Lucas' Island, Nanticoke river.....	300,000
" 6	20	500,000	450,000	" 24. At Riverton, Nanticoke river.....	700,000
" 7	18	450,000	425,000	" 27. At Plumb creek.....	150,000
" 8	4	100,000	90,000		
" 9	9	225,000	200,000		
" 10	10	250,000	225,000		
" 13	5	125,000	115,000		
" 15	7	175,000	150,000		
" 16	9	225,000	200,000		
" 17	5	125,000	115,000		
" 20	15	375,000	345,000		
" 21	18	450,000	400,000		
" 22	5	125,000	115,000		
" 23	2	50,000	40,000		
268		6,700,000	6,075,000		6,075,000

RECORD OF SHAD-HATCHING OPERATIONS AT SALISBURY STATION, FROM APRIL 10 TO MAY 25, 1895, BY SYLVANUS TRADER, SUPERINTENDENT.

DATE.	SHAD STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
April 10	1	25,000	.....	
" 11	7	175,000	.....	
" 12	2	50,000	.....	
" 13	2	50,000	.....	
" 16	5	125,000	.....	
" 17	2	50,000	.....	
" 18	10	250,000	.....	
" 19	8	200,000	.....	
" 20	5	125,000	.....	
" 23	10	250,000	.....	
" 24	16	400,000	.....	
" 25	14	350,000	.....	
" 26	6	150,000	.....	
" 27	12	300,000	.....	April 19. At Salisbury, Wicomico river.....	20,000
May 1	8	200,000	.....	" 20. At Salisbury, Wicomico river.....	150,000
" 2	7	175,000	.....	" 22. At Salisbury, Wicomico river.....	40,000
" 3	5	125,000	.....	" 24. At Salisbury, Wicomico river.....	150,000
" 4	6	150,000	.....	" 25. At Princess Anne, Manokin river.....	600,000
" 6	7	175,000	.....	" 30. At Herring Creek, St. Martin's river.....	500,000
" 7	6	150,000	.....	May 4. At Salisbury, Wicomico river.....	250,000
" 8	8	200,000	.....	" 9. At Salisbury, Wicomico river.....	350,000
" 9	13	325,000	.....	" 10. At Salisbury, Wicomico river.....	250,000
" 11	10	250,000	.....	" 11. At Pocomoke City, Pocomoke river.....	400,000
" 14	12	300,000	.....	" 15. At Snow Hill, Pocomoke river.....	500,000
" 15	22	550,000	.....	" 22. At Snow Hill, Pocomoke river.....	500,000
" 16	12	300,000	.....	" 23. At Salisbury, Wicomico river.....	300,000
" 17	22	550,000	.....	" 24. At Salisbury, Wicomico river.....	500,000
" 18	8	200,000	.....	" 25. At Salisbury, Wicomico river.....	175,000
					4,685,000

RECORD OF HERRING HATCHING OPERATIONS AT SHARPTOWN (NANTICOKE STATION), FROM APRIL 11 TO MAY 27,
1895, BY WALTER C. MANN, SUPERINTENDENT.

DATE,	HERRING STRIPPED.	Eggs OBTAINED.	Eggs HATCHED.	WHEN AND WHERE DISTRIBUTED.	No. Fry DEPOSITED.
April 11	6	150,000	135,000	April 22. Plumb creek.....	125,000
" 17	5	125,000	110,000	" 23. "	100,000
" 18	2	50,000	45,000	" 24. "	50,000
May 1	10	250,000	225,000	May 6. Sharptown.....	225,000
" 2	3	75,000	60,000	" 7. "	75,000
" 22	77	1,925,000	1,800,000	" 25. "	1,800,000
" 23	35	875,000	800,000	" 27. "	800,000
	138	3,450,000	3,175,000		3,175,000

RECORD OF WHITE PERCH OPERATIONS AT TUCKAHOE STATION, FROM MARCH 21 TO APRIL 15, 1895, BY THOMAS HUGHETT, JR., SUPERINTENDENT.

DATE.	FISH STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NUMBER.
March 21	300	9,000,000	6,000,000	At Back creek bridge, tributary of Manokin river, Somerset county.....	1,500,000
" 25	400	12,000,000	8,250,000	" Annanessex bridge, tributary of Big Annanessex river, Somerset county.....	2,500,000
" 28	400	12,000,000	8,250,000	" Maple dam bridge, Little Blackwater river, Dorchester county.....	1,000,000
April 2	500	15,000,000	9,500,000	In tributaries of the Choptank river.....	27,000,000
	1,600	48,000,000	32,000,000		32,000,000

RECORD OF PERCH HATCHING OPERATIONS AT SHARPTOWN (NANTICOKE STATION), FROM APRIL 9TH TO APRIL 18TH, 1895, BY WALTER C. MANN, SUPERINTENDENT.

DATE.	PERCH STRIPPED.	EGGS OBTAINED.	EGGS HATCHED.	WHEN AND WHERE DISTRIBUTED.	NO. FRY DEPOSITED.
April 9	12	300,000	.....	April 13. Plumb creek.....	250,000
" 10	12	300,000	.....	" 16. ".....	250,000
" 11	16	400,000	.....	" 17. Sharptown.....	875,000
" 12	19	475,000	.....	" 18. ".....	450,000
	59	1,475,000	.....		1,325,000

RECAPITULATION OF SHAD HATCHING OPERATIONS IN THE STATE OF MARYLAND, FROM 1875 TO 1895, INCLUSIVE.

DATE.	SHAD STRIPPED.	EGGS OBTAINED.	NUMBER HATCHED.	LOCALITY DEPOSITED.	NUMBER FRY DEPOSITED.
1875	605	11,690,000	9,315,550	{ By State in Maryland waters.....	4,340,000
1876	.....	9,000,000	4,622,000	{ By United States Commission in Potomac river.	4,975,000
1877	1,284	10,584,000	8,444,300	{ In Maryland waters.....	2,724,500
1878	.....	12,730,000	8,235,000	{ In other localities.....	1,897,500
1879	2,067	20,355,000	16,062,000	{ By State in Maryland waters.....	7,319,300
1880	3,576	34,104,000	30,608,000	{ Turned over to U. S. Fish Commission.....	1,125,000
1881	1,071	11,960,000	8,860,000	{ In Potomac river.....	1,175,000
1882	1,279	12,220,000	11,080,000	{ In Susquehanna river.....	5,105,000
1883	2,584	23,420,000	17,640,000	{ In other waters of Maryland.....	2,005,000
1884	.....	13,105,000	10,791,000	{ In Maryland waters.....	7,757,000
1885	1,236	15,050,000	12,665,000	{ In Pennsylvania and other waters, by United }	8,305,000
1886	606	15,050,000	12,665,000	{ States Fish Commission..... }	23,498,000
1887	.....	15,050,000	12,665,000	{ In Maryland waters..... }	7,110,000
*1888	.....	59,975,000	52,735,000	{ In other waters..... }	8,363,000
1889	1,766	28,925,000	22,265,000	{ In Maryland waters..... }	11,080,000
1890	1,157	35,825,000	26,340,000	{ In Maryland waters..... }	17,640,000
1891	1,143	30,775,000	22,265,000	{ In Western Shore waters..... }	10,791,000
1892	1,231	53,175,000	37,825,000	{ In Eastern Shore waters..... }	8,200,000
1893	2,207	52,225,000	40,075,000	{ In Western Shore waters..... }	12,665,000
1894	2,089	64,975,000	45,260,000	{ In Eastern Shore waters..... }	2,150,000
1895	2,599	.....	.....	{ In Western Shore waters..... }	1,450,000

* Report of 1888 included in that of 1889.

+ No report as to number shad stripped, eggs obtained, fry hatched.

RECAPITULATION—FOOD-FISHES DISTRIBUTED IN MARYLAND WATERS BY THE MARYLAND FISH COMMISSIONERS, FROM 1874 TO 1895, INCLUSIVE.

NAME OF FISH.	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884
Carp.....									8,145		
Herring.....									365,000		
Perch.....									8,040,000		
Salmon (California)...	144,000	91,500	1,088,304	150,500	710,600	312,236	421,952				
Salmon (Land Locked)...			22,600		40,781	26,500	16,900				
Shad.....		4,340,000	2,724,500	7,319,300	3,283,000	7,757,000	23,498,000	8,363,000	11,080,000	17,640,000	
Smelt.....			3,475	400,000							
Trout (Brook).....				50,480	234,500	47,000	57,180				
Trout (California).....						6,135	12,768				
Trout (Rainbow).....											

RECAPITULATION—FOOD-FISHES DISTRIBUTED IN MARYLAND WATERS BY THE MARYLAND FISH COMMISSIONERS, FROM 1874 TO 1895, INCLUSIVE.

NAME OF FISH.	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895
Carp.....			101,580			3,000	3,150	2,650	6,305	1,000	775
Herring.....			10,450,000					7,300,000		3,550,000	3,175,000
Perch.....			2,775,000			2,500,000		650,000			33,325,000
Salmon (California)...											
Salmon (Land Locked)...											
Shad.....	10,791,000	20,865,000		(*)	52,735,000	22,265,000	58,070,000	48,765,000	50,325,000	42,225,000	46,710,000
Smelt.....											
Trout (Brook).....			400,700				117,800	49,800	151,600	212,150	75,400
Trout (California).....											
Trout (Rainbow).....							2,000		38,000		

* Included in 1889.

*Statement showing the Species and Number of Fish and Fish Eggs furnished to
Waters in Maryland by the U. S. Fish Commission during the fiscal
year 1894-1895.*

Number.	Species.	Waters stocked.	Point of Deposit.
679 c	Carp.	Applicants.	
500 c	"	Maryland Fish	Commission.
175 c	Tench.	Applicants,	
104 c	Goldfish.	"	
375 c	"	Maryland Fish	Commission.
1,826,000 a	Shad.	Patuxent river,	Laurel.
1,788,000 a	"	Potomac river,	Point of Rocks.
454,000 a	"	"	Weverton.
1,796,000 a	"	"	Washington Junction.
366,000 a	"	"	Hancock.
1,347,000 a	"	Patapsco river,	Relay Station.
1,368,000 a	"	Susquehanna river,	Port Deposit.
621,000 a	"	" "	Garrett Island.
1,518,000 a	"	North East river,	Red Bank.
320,000 a	"	" "	Carpenter's Point.
4,543,000 a	"	Chesapeake bay,	Battery Island.
852,000 b	"	" "	" "
914,000 a	"	" " "	Spesutia Island.
600,000 a	"	Swan creek,	Plum Point.
504,000 a	"	Wicomico river,	Salisbury.
504,000 a	"	Tuckahoe creek,	Queen Anne's
504,000 a	"	Chester river,	Chestertown.
8,000 a	Rainbow		
	trout	Stream near	Randolph.
500 c	"	Bee Tree run,	Bentley Springs.
300 c	"	Indiau Spring,	Frederick.
500 c	"	Monocacy river,	Frederick Junction.
800 c	"	Marsh run,	McHenry.
1,000 c	"	Western Run river,	Glyndon.
900 c	"	Little Gunpowder river,	Glencoe.
500 c	"	Stream near	Glyndon.
500 c	"	Horsey stream,	Hebron.
400 c	"	Lake Brown,	Oakland.
500 c	"	Stream near	Finksburg.
500 c	"	Savage stream,	Lonaconing.
100 c	Black Bass.	Lake near	Halpin.
100 c	"	Winter's dam,	Westminster.
100 c	"	Potomac river,	Woodmont.
91 c	"	C. & O. Canal, above	Great Falls.
130 c	"	Applicants,	
200 c	Rock Bass.	Benastico creek,	Weverton.
200 c	" "	Patapsco river,	Westminster.

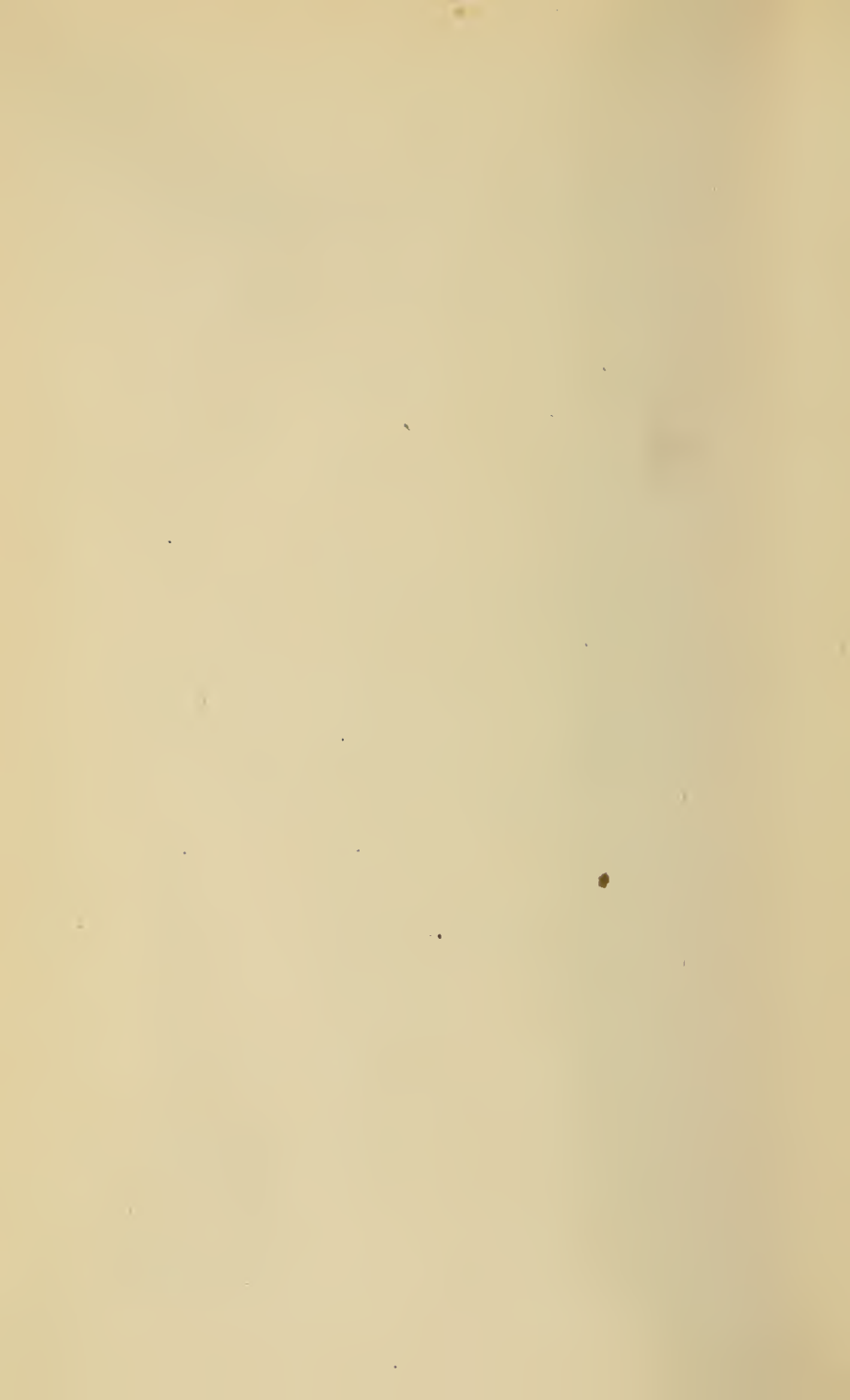
a—Fry.

b—Eggs.

c—Yearlings.

APPENDIX "B."

CONTAINING A LIST OF THE FISH COMMISSIONERS OF THE SEVERAL STATES
AND TERRITORIES OF THE UNITED STATES, AND A LIST OF THE
PRINCIPAL OFFICERS AND SUPERINTENDENTS OF STATIONS
OF THE UNITED STATES FISH COMMISSION, UP TO
DECEMBER 30, 1895.



DIRECTORY

Of the Names and Addresses of the Fish Commissioners of the several States and Territories of the United States, obtained in response to a circular letter issued October 25, 1895, to the Secretary of State of each State and Territory, as follows :

“ Will you kindly furnish below the names and residences of the Fish Commissioners, if any, of your State or Territory, their officers (President, Secretary or Treasurer), and dates on which their terms of office expire ; also the names and locations of the State's fish-cultural stations, if any, and the names of their Superintendents, together with a statement of the appropriations made for the work of the Commission during the year. This information is desired for publication in our annual report.”

ALABAMA.

Has no Fish Commission.

ALASKA.

None appointed by Territorial Government.

Joseph Murray appointed Commissioner of Salmon Fisheries by United States Treasury Department.

ARIZONA.

Edward Schwartz.....Phoenix
No fish-cultural stations.
No appropriation for the year.

ARKANSAS.

No Fish or Game Commissioners nor fish-cultural stations.

CALIFORNIA.

H. M. Emerick,* President, nominated January, 1895.....San Francisco
Wm. C. Murdoch,* nominated February, 1893.....San Francisco
J. M. Morrison,* nominated March, 1895.....Sacramento

Address all communications to California Fish Commission, 78 Flood Building, San Francisco.

* Hold office at the pleasure of the Government.

FISH CULTURAL STATIONS.

<i>Station.</i>	<i>Superintendent.</i>	<i>P. O. Address.</i>
Sisson.....	W. H. Shebley.....	Sisson
Tahoe.....	E. W. Hunt.....	Tahoe City
Battle Creek.....	E. W. Hunt.....	Ball's Ferry
Wawona.....	A. G. Fletcher.....	Wawona
Bear Valley.*		

Appropriations each year for the 47th and 48th fiscal years (1895-6 and 1896-7):

Support and maintenance of State hatcheries.....	\$ 7,500
Restoration and preservation of fish and game	10,000

COLORADO.

No report.

CONNECTICUT.

COMMISSIONERS OF FISHERIES AND GAME.

<i>Term expires.</i>		<i>P. O. Address.</i>
May 1, 1897	Hubert Williams, President.....	Salisbury
May 1, 1897.....	Abbott C. Collins, Secretary.....	Hartford
May 1, 1897.....	James A. Bill, Treasurer.....	Bill Hill

FISH CULTURAL STATIONS.

Poquonock	James A. Sterling.....	Bill Hill
Shelton.....	Gilbert B. Sterling.....	Bill Hill

Appropriations for two years: \$5,000 for trout, \$5,000 for shad, and \$3,000 for salaries.

DELAWARE.

August 13, 1896.....	James A. Mulligan	Delaware City
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FISH CULTURAL STATIONS.

Wilmington and Brandywine Creek..	Dr. E. G. Shortlidge....	Wilmington
Appropriation for the year, \$600.		

FLORIDA.

M. Mosely.....	Palatka
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The Governor appointed three Fish Commissioners two years ago, but only one qualified, there being a little friction about pay.

GEORGIA.

I. D. Edmundson.....	La Grange
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Term expires at the pleasure of the Commissioners of Agriculture.

There are no fish cultural stations.

No appropriation for the year reported.

IDAHO.

Has no Fish Commissioners.

* Not opened last year.

ILLINOIS.

July 15, 1895.....	Richard Roe, President.....	East St. Louis
July 15, 1896.....	Geo. W. Langford, Secretary.....	Havana
July 15, 1896.....	Henry Schmidt.....	Elgin

FISH CULTURAL STATION.

S. P. Bartlett, Superintendent	Quincy
No hatchery in the State. Appropriation for the year, \$10,000.	

INDIANA.

February 28, 1897.....	P. H. Kirsch.....	Columbia City
No fish cultural stations.		
Appropriation for the year, \$800, inclusive of Commissioner's salary.		

IOWA.

April 1, 1896.....	George E. Delevan.....	Spirit Lake
No fish-cultural stations.		
Appropriation for the year, \$3,000.		

KANSAS.

March 27, 1897.....	Otis E. Sadler.....	Eldorado
No fish-cultural stations.		
Appropriations for the year: \$300 salary, \$200 traveling expenses, \$500 for stocking streams, etc.		

KENTUCKY.

Has no Fish Commission.

LOUISIANA.

Has no Fish Commission.

MAINE.

April, 1896.....	Thos. H. Wentworth, Chairman.....	Bangor
Dec., 1895	Henry O. Stanley.....	Dixfield
Feb., 1896	Charles E. Oak, Sec. and Treas.....	Caribou

FISH-CULTURAL STATIONS.

Lake Auburn.....	Arthur Merrill.....	East Auburn
Caribou	B. J. Briggs.....	Caribou
Edes Falls.....	C. D. Floyd.....	Edes Falls
Appropriation for the year, \$25,000.		

MARYLAND.

May 14, 1896.....	John S. Sudler.....	Manokin
May 14, 1896.....	Richard T. Browning.....	Oakland

FISH-CULTURAL STATIONS.

Choptank.....	Thos. Hughlett, Jr.....	Cambridge
Nanticoke	Walter C. Mann.....	Sharptown
Wicomico.....	Sylvanus Trader.....	Salisbury
Druid Hill Park	Jacob H. Plowman.....	Van Bibber
Appropriation for the year, \$7,500.		

MASSACHUSETTS.

COMMISSIONERS ON INLAND FISHERIES AND GAME.

Oct. 11, 1899.....	Edward A. Brackett.....	Winchester
Oct. 25, 1899.....	Isaiah C. Young.....	Wellfleet
Feb. 8, 1899.....	Elisha D. Buffington.....	Worcester
Appropriation for the year, \$13,650.		

MICHIGAN.

Jan. 1, 1897.....	Hershel Whitaker, President.....	Detroit
Jan. 1, 1899.....	Horace W. Davis.....	Grand Rapids
Jan. 1, 1901.....	Freeman B. Dickerson.....	Detroit
	Seymour Bower, Superintendent.....	Detroit
	Geo. D. Mussey, Secretary.....	Detroit
	Wm. A. Butler, Jr., Treasurer.....	Detroit

FISH-CULTURAL STATIONS.

<i>Station.</i>	<i>Overseer.</i>	
Detroit.....	James P. Marks.....	Detroit
Paris	J. W. Powers.....	Paris
Sault Ste. Marie.....	H. H. Marks.....	Sault Ste. Marie
Glenwood	Worden Wills	Glenwood
Charlevoix.....	J. P. Marks.....	Charlevoix

Appropriations:

1895, current expenses.....	\$27,500
1896, current expenses.....	27,500
1895, special, for construction of ponds, repairs of buildings and purchase of lands.. ..	5 000

MINNESOTA.

1901.....	William Bird.....	Fairmount
1901.....	Samuel F. Fullerton, Executive Agent... ..	St. Paul
1897.....	W. S. Timberlake, President... ..	St. Paul
1897.....	A. F. Ferris, Treasurer	Brainard
1899.....	Fred. von Baumbach, Secretary.....	Alexandria

FISH-CULTURAL STATION.

Willow Brook.....	S. S. Watkins.....	St. Paul
Appropriation for the year, \$15,000.		

MISSISSIPPI.

No report.

MISSOURI.

January, 1897...	John T. Crisp, Chairman...	Independence
January, 1897.....	Joseph L. Griswold.....	St. Louis
January, 1897.....	E. A. Donelan, M.D.....	St. Joseph
	N. B. Crisp, Secretary.....	Independence

FISH-CULTURAL STATIONS.

St. Louis.....	Not known.
St. Joseph.....	Not known.
Neosho.....	Not known.

Appropriation for two years, \$15,000.

MONTANA.

W. B. Green.....	Kalispel
John F. Cowan.....	Butte
Percy Kennett.....	Helena

Term of office for one, two and three years to be decided by lot.

No fish-cultural stations reported.

No appropriation reported.

NEBRASKA.

June 1, 1896	J. S. Kirkpatrick, President.....	Lincoln
June 1, 1897.....	W. L. May	Omaha
June 1, 1898.....	R. S. Oberfelder, Secretary.....	Sidney

FISH-CULTURAL STATIONS.

M. E. O'Brien, Superintendent.....	South Bend
Will O'Brien, Assistant Superintendent.....	At hatcheries

Appropriations for the year 1894 and 1895: Salary Superintendent, \$2,400; other expenses, \$8,550; total, \$10,950.

NEVADA.

February 23, 1896.....	George T. Mills.....	Carson City
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FISH CULTURAL STATIONS.

Carson City.....	F. C. Boyce.....	Carson City
Elko.....	P. D. Doval	Elko

Appropriation for the year, \$1,500.

NEW HAMPSHIRE.

June 23, 1896.....	Willard H. Griffin.....	Manchester
December 2, 1897.....	Nathaniel Wentworth.....	Hudson
July 12, 1898.....	William H. Shurtleff.....	Lancaster

FISH CULTURAL STATIONS.

Colebrook.....	A. C. Wallace
Plymouth*.....	
Phynorth	D. H. McLinn
Ashland.....	F. L. Hughes
Meredith.....	J. S. Robinson
Laconia	O. H. Daniels
Bristol	

* Owned jointly by New Hampshire and Massachusetts.

Manchester.....	H. C. Wallace
Keene.....	E. E. Cone
Sunapee Lake.....	J. G. Wentworth
New Durham.....	
Conway.....	

New stations.

Appropriations not limited. The Governor and Council allow about \$7,000 annually.

NEW JERSEY.

FISH AND GAME COMMISSIONERS.

May 17, 1899..George Pfeiffer Jr., President.....	Camden
May 17, 1899..Parker W. Page.....	Summit
May 17, 1899..Howard P. Frothingham, Secy. and Treas....	Mt. Arlington
May 17, 1899..W. Campbell Clark.....	Newark

No fish-cultural stations.

Appropriation for the Fish and Game Warden, \$15,600; for expenses, \$5,900; total, \$21,500.

NEW MEXICO.

Has no Fish Commission as such. The legislative act approved February 14, 1889, entitled "An act to provide for the protection and propagation of fish" provides that the Governor shall "appoint fish wardens in each county of this territory, who shall hold their office during the pleasure of the Governor." Under this act, forty-four wardens have been appointed.

For special information concerning the introduction of fish refer to H. S. Clancey, one of the fish wardens, Santa Fe, New Mexico.

NEW YORK.

FISHERIES, GAME AND FOREST COMMISSION.

April 25, 1900.....	Barnet H. Davis, Pres.....	Palmyra
April 25, 1900.....	Henry H. Lyman.....	Oswego
April 25, 1900.....	Wm. R. Weed.....	Potsdam
April 25, 1900.....	Charles H. Babcock.....	Rochester
April 25, 1900.....	Edward Thompson.....	Northport
	Franklin B. Mitchell, Secy.....	Albany

FISH-CULTURAL STATIONS.

Caledonia.....	Caledonia
Adirondack.....	Saranac Inn
Sacandaga.....	Newtons Corners
Fulton Chain.....	Old Forge
Cold Spring.....	Cold Spring Harbor
Pleasant Valley.....	Taggart
Beaverkill.....	Rockland

James Annin Jr., General Superintendent.....Caladonia.

A. N. Cheney, Fish-Culturist.....Glen Falls.

Appropriation for the year, \$82,250.82.

NORTH CAROLINA.

Has no Commission.

NORTH DAKOTA.

COMMISSIONER OF FISH AND GAME.

March 1, 1895.....W. H. BarrettChurch's Ferry
 Successor has not yet been appointed.
 Appropriation for the year, \$1,000.

OHIO.

FISH AND GAME COMMISSIONERS.

1896.....H. B. Vincent, Pres.....McConnellsville
 1897.....B. F. Seitner, Secy.....Dayton
 1898.....W. R. Huntington.....Cleveland
 1899.....J. W. Owens.....Newark
 1900.....E. H. Shorb.....Van Wert

FISH-CULTURAL STATIONS.

Lakefish hatching....E. S. Downing.....Sandusky
 Bass and croppies hatching...J. A. Sheffield.....Chagrin Falls
 Mullet and catfish hatching...J. C. Lee.....Waverly
 Appropriation for 1895, \$7,500.

OKLAHOMA.

Has no Fish Commission.

OREGON.

STATE FISH AND GAME PROTECTOR.

March 1, 1897.....Hollister D. McGuire.....Portland

FISH-CULTURAL STATIONS.

(U. S.) Clackamas (lower river)..Waldo F. Hubbard.....Clackamas
 (U. S.) Clackamas (upper river)..Owned by salmon packers, F. M. Warren, President, Portland.
 (State) Seaton.....H. D. McGuire.....Portland
 The Legislature failed to make any appropriation last year.

PENNSYLVANIA.

July 15, 1896.....D. P. Corwin.....Pittsburg
 July 15, 1896.....James A. Dale, M. D.....York
 July 15, 1897.....Louis Streuber.....Erie
 July 15, 1897.....S. B. Stillwell.....Scranton
 Two vacancies.

FISH-CULTURAL STATIONS.

Allentown.....Don't know
 Corry.....Don't know
 Appropriation for the year, \$23,500.

RHODE ISLAND.

COMMISSIONERS OF FISHERIES.

April, 1897.....	Henry T. Root.....	Providence
April, 1897.....	William P. Morton.....	Olneyville
April, 1897.....	J. M. K. Southwick.....	Newport
April, 1897.....	Charles W. Willard.....	Westerly
April, 1897.....	Adelbert Roberts.....	Woonsocket

Has no fish-cultural stations.

Appropriation for the year, \$1,500.

SOUTH CAROLINA.

Has no Fish Commission.

SOUTH DAKOTA.

Has no fish commission.

A fish-warden, forty-nine in all, is appointed by the Governor in each county for one year.

Frank J. Adams, Brookings.	E. L. Pierce, Gettysburg.
John L. Babcock, Aberdeen.	C. S. Munger, Carthage.
Wm. L. Burton, Burnside.	Geo. W. Craig, Mound City.
Andrew J. Lockhart, Clear Lake.	W. H. Woodworth, White Lake.
Frank W. Thorndyke, Big Stone City.	John Frederick, Sturgis.
John A. Clark, Spearfish.	T. J. Reeves, Akron (Iowa).
R. F. Brown, Sioux Falls.	Frank Stevens, Tyndall.
L. J. Ludloff, Big Stone City.	George Damon, Clark.
J. R. Taylor, Webster.	George Mead, Madison.
Frank Baughman, Mitchell.	E. C. Stilwell, Canton.
L. N. Loomis, Alpena.	Henry Hetzler, Eureka.
John H. Griffin, Pierre.	V. B. Davis, Huron.
H. H. Heath, Artesian.	J. W. Warnhuis, Chamberlain.
Seeley Billingshurst, Ashton.	Sidney A. Dimack, Chapelle.
B. Ober, Flandreau.	Geo. W. Ryan, Blue Blanket.
George W. Amey, Parker.	Theodore Elfes, Castalia.
Mark Purdy, Faulkton.	E. T. Sweet, Menno.
A. B. Chubuck, Ipswich.	H. J. Haskins, St. Lawrence.
Chas. C. Crary, Custer.	Frank E. Erdman, Belle Fourche.
W. L. Gardner, Rapid City.	Wm. L. Hinckley, Britton.
A. L. Stewart, Hot Springs.	Chas. H. Hering, Hazel.
A. E. Bailey, Oacoma.	David Lowrey, Alexandria.
Jos. R. Hanson, Yankton.	Murray W. Westfall, Watertown.
John V. Drips, Game Valley.	H. Y. Stintson, Camitata.
	J. W. Russell, Vermillion.

TENNESSEE.

Has no fish commission. The Commissioner of Agriculture, T. F. P. Allison, at Nashville, writes that under State law approved April 8, 1893, counties may have their own fish commissioners, to be elected by justices of their several county courts.

For information address "Chairman" of various county courts.

TEXAS.

FISH AND OYSTER COMMISSIONER.

January, 1897.....J. P. Kibbe.....Golad
 Has no fish-cultural stations.
 No appropriation reported.

UTAH.

Dec. 31, 1895.....A. Milton Musser.....Salt Lake City
 No fish-cultural stations.
 Appropriation for the year, \$250, salary of Commissioner.

VERMONT.

Dec. 1, 1896.....John W. Titcomb.....St. Johnsbury
 Dec. 1, 1896.....Horace W. Bailey.....Newberry

FISH-CULTURAL STATIONS.

St. Johnsbury.....John W. Titcomb .. St. Johnsbury
 Roxbury.....John W. Titcomb.....St. Johnsbury
 No appropriation reported.

VIRGINIA.

No report.

WASHINGTON.

March, 1898.....James Crawford.....Vancouver
 A. E. Houchen, Deputy.....Ilwaco, or Chinook.*
 S. L. Miller, Deputy.....Brookfield
 J. A. Gale, Deputy.....Seattle

FISH-CULTURAL STATIONS.

Chinook.....A. E. Houchen.....Chinook
 Kalama.....Sol. Wheeler.....Kalama

Appropriation for two years, salaries and incidentals, \$7,500; for building and operating salmon hatcheries for two years, \$20,000.

WEST VIRGINIA.

Has no Fish Commission.

WISCONSIN.

April 1, 1897.....Edwin E. Bryant, President.....Madison
 April 1, 1898.....Calvert Spensley, Treasurer.....Mineral Point
 April 1, 1897.....William J. Starr.....Eau Claire
 Professor E. A. Birge, ex-officio.....Madison
 April, 1898.....James J. Hogan.....La Crosse
 April 1, 1899.....George F. Peabody.....Appleton
 April 1, 1899.....Currie G. Bell.....Bayfield
 May 6, 1897.....Jas. T. Ellarson, Secy. & Fish & Game Warden....Madison
 The Governor, ex-officio.....Madison

* At pleasure of Fish Commissioners.

FISH-CULTURAL STATIONS.

Madison.....	James Nevin.....	Madison
Milwaukee.....	James Nevin.....	Madison
Bayfield.	James Nevin.....	Madison
Appropriation for the year, \$20,000.		

WYOMING.

Feb. 18, 1897.....	Gustav Schnitger.....	Laramie
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FISH-CULTURAL STATIONS.

Laramie.....	G. Schnitger.....	Laramie
Sheridan.....	S. E. Land.....	Laramie
Sundance		Sundance
Appropriation for two years for fish-cultural stations, \$7,400.		

UNITED STATES COMMISSION OF FISH AND FISHERIES.

(Authorized by Act of Congress, approved February 9, 1871.)

*COMMISSIONER.

Marshall McDonald, Washington, D. C.

CHIEF CLERK.

Herbert A. Gill.

DIVISION ASSISTANTS.

Richard Rathbun, inquiry respecting food fishes.

Tarleton H. Bean, fish culture.

H. M. Smith, inquiry respecting statistics, methods and relations of the fisheries.

FISH CULTURAL STATIONS.

Green Lake, Maine, E. M. Robinson, Superintendent.

East Orland, Maine, Charles G. Atkins, Superintendent.

Gloucester, Mass., E. F. Locke, Custodian.

Wood's Holl, Mass., John Maxwell, Superintendent.

Battery Island, Havre de Grace, Md., W. de C. Ravenel, Superintendent.

Bryan's Point, Potomac River, Md., S. G. Worth, Superintendent.

Central Station, Washington, D. C., S. G. Worth, Superintendent.

Fish Ponds, Washington, D. C., R. Hessel, Superintendent.

Wytheville, Va., George A. Seagle, Superintendent.

Put-in-Bay, Ohio, J. J. Stranahan, Superintendent.

Northville, Mich., Frank N. Clark, Superintendent.

Alpena, Mich., Frank N. Clark, Superintendent.

Quincy, Ill., S. P. Bartlett, Superintendent.

Duluth, Minn., S. P. Wires, Superintendent.

Neosho, Mo., W. F. Page, Superintendent.

Leadville, Colorado, H. D. Dean, Superintendent.

Baird, California, Livingston Stone, Superintendent.

Ft. Gaston, California, Capt. W. E. Dougherty, U. S. A., in charge

Clackamas, Oregon, W. F. Hubbard, Superintendent.

STATIONS AUTHORIZED, BUT NOT YET ESTABLISHED.

New York, on or near St. Lawrence River.

Vermont, St. Johnsbury.

Texas, San Marcos.

Montana, Bozeman.

*At pleasure of President.

UNIV. OF MD COLLEGE PARK



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N MANCHESTER,
INDIANA

